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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Developing Empire Industries

IN THE CHEMICAL AGE of September 5 attention was drawn by our Indian correspondent to the development of the vegetable oil seeds and associated industries in the Punjab Province, and to a valuable report on the subject prepared by a British expert for the Punjab Government. Our readers may now be interested to know that the author of the report is Mr. John Brewis (of George Scott and Son (London), Ltd.), who was invited by the Government to undertake this important work. Mr. Brewis is well known as an authority on oil extraction methods, with long experience in the management of modern oil-manufacturing plants for treating a wide variety of seeds by both the pressing and the solvent extraction methods, as well as in the actual manufacture of plant for this work. Figures were collected as the result of an exhaustive questionnaire sent to all parts of the Punjab, through which Mr. Brewis travelled personally for the best part of a year, visiting the producing areas and various mills. He examined the conditions existing in mills dealing with a wide variety of seeds, and samples of the seeds and the products obtained by existing methods were collected and analysed on his return to England.

By the courtesy of the firm with which Mr. Brewis is associated, we have been able to obtain a copy of his report. It is one of the most workmanlike documents of the kind that we have ever seen—a model of brevity and clearness, and an immense library of facts set out in convenient order and sequence. If it represented the average standard of British business methods, there would be little, indeed, that firms of other nations could teach us. It deals, section by section, with the seeds available in the Punjab and the purposes for which their oil is used, the existing methods of extracting oil from seeds in the province (the indigenous method and the pressing system, for example), the importance of practical and technical knowledge in the vegetable oil industry, modern oil mill machinery and equipment, the extraction of oil by volatile solvents, the proposed Government mill for demonstration purposes, recommendations for the development of the vegetable oil industry by private enterprise, the refining of vegetable oils, the manufacture of soap in the Punjab, and the native manufacture of vegetable butter. There are also valuable tables of costing and similar data and numerous illustrations of plant used in the seed industry.

As our Indian correspondent pointed out, the Punjab is a province of vast dimensions, producing annually about 205,000 tons of oil seeds, the bulk of which is exported. The great defect in the present state of the oil industry there is the want of modern methods of pressing and extraction. The indigenous method is of the most primitive type, consisting of a pestle and mortar, worked by bullocks. Even in mills where power-driven presses are employed, the output per press is very low, because there are very few trained men having a real knowledge of the industry. It is, therefore, recommended that with a view to giving expert advice to the existing mills and carrying out improvements in the processes, the Government should create a special branch attached to the Industries Department under the guidance of an expert. Further, it is proposed that a Government demonstration mill should be started for the purpose of demonstrating the methods of operating modern mill plant, the refining of oils, the manufacture of artificial butter, soap and glycerine, and of giving a lead to the vegetable oil industry generally. The demonstration mill will at the beginning produce good quality crude oil and saleable cake, as the market has not yet been prepared for the reception and use of higher grades of oil. The mill is to be so designed that it may include eventually refining, deodorising, and soap-making plants.

It will be seen, therefore, that important industrial and commercial results may follow from Mr. Brewis's investigations. It is an example of what has frequently been pointed out in these columns, namely, the immense importance of chemistry and chemical engineering in developing the natural resources of the Empire, and the scope that the overseas dominions offer for the employment of chemists and technologists, and for the utilisation of British plant.

Alumina as an Adsorbent

SOME recent work that has been carried out in America in connection with adsorptive properties of materials is certainly worthy of study in conjunction with similar investigations that have lately been undertaken in this country by the National Benzole Association and others. We have already commented on the useful data which Mr. W. H. Hoffert has gathered from his researches at Leeds, and the main reason for returning to the subject is that while over here the tendency is to adhere to stereotyped adsorbents, such as active carbon and silica gel, in America they are looking in the direction of other substances. Some few months ago Messrs. Munro and Johnson, of McGill University, Montreal, contributed to the proceedings of the American Chemical Society a paper which described the results obtained in an examination of the use of alumina for the purpose of vapour adsorption, about thirty different vapours having been studied. Certainly, the similarity between silica and alumina gels suggests that the latter should provide quite an efficient adsorbent, and it is not surprising to find that it proves effective for such vapours as ether, benzene, the alcohols, sulphur dioxide, and ammonia. On the other hand, it is not suitable for the recovery of acetone, ethyl and amyl acetate, and alkyl halides.

Apart from differentiating between the vapours for which alumina is or is not suitable, the American work draws attention to the mechanism of its adsorption, and points out that its adsorptive power largely depends upon its state of hydration. There is, in fact, an optimum condition so far as the relation between adsorption and water content is concerned, much in the same way as with silica gel, which has been found to give the best results when containing from 5 to 7 per cent. of water, and not when dehydration is carried further. The phenomenon of these optimum conditions has been explained by the supposition that further dehydration increases the diameters of the pores in the gel, thereby diminishing the capillary forces, so that a smaller amount of the adsorbed substance is taken up. Again, the presence of more than 8 per cent. of moisture means the filling of the smaller capillaries with water, this reducing the surface and capillary volume available for the vapour.

These considerations of physical condition are in themselves of extreme interest and importance, but the main point in view must be the ultimate adsorptive capacity of the alumina gel as compared with the more commonly known alternatives. For this reason it is instructive to take the results published by the Montreal workers and put them against those recently given by Mr. Hoffert. In order to make a comparson with the Leeds figures it is necessary to select one vapour, benzene, from the many experimented with by Messrs. Munro and Johnson. The comparison is then as follows, the figures referring to the grams of vapour retained per 100 grams of adsorbent :—

Leeds	Active carbon	15 to 30
	Silica gel	8 to 14
	Iron oxide gel	4 to 16
	Alumina	15·7

The conditions of conducting the two series of experiments do not make the results exactly comparable, but they are certainly sufficiently similar to warrant the opinion that alumina presents considerable possibilities. We cannot for the moment recollect having seen the results of any work with this last-named adsorbent in this country, but it would certainly appear to be worth the attention of those who are carrying out the experimental work of the National Benzole Association.

Popularising Chemical Studies

MR. G. H. GATER, the Education Officer to the London County Council, is to be congratulated on the clear and attractive way in which he has set out the facilities now provided by the Council for efficient and economical instruction in pure and applied chemistry. The courses of training in the various London institutions are adapted to meet the needs of three principal groups of chemical students. The larger institutions provide for the student who on leaving school desires to become fully qualified in chemistry by obtaining such diplomas as the A.I.C. or the London B.Sc. degree, and who is able and willing to devote three or four years of whole-time study to this end. With an optimism that many a student who has obtained these qualifications may not entirely share, it is stated that " such a course of training gives him the best possible chance of future success in the profession of chemistry." When qualified, he is informed, positions will be open to him in varying capacities in analytical chemistry, as a chemist in works or works manager, as a research assistant in scientific and industrial laboratories, in the Government and municipal chemical services, in agricultural and biological chemistry, and as a teacher or lecturer in chemistry. All these are indeed open to him ; but unhappily there is often not sufficient to go round.

The second class of institution assists those who on leaving school have secured a junior position in some form of chemical work and desire to obtain the same qualifications by evening study. It is satisfactory to hear that this is now possible but obviously a much longer period is necessary, owing to the large amount of theoretical and practical work to be covered and the necessary limitation of time in the evenings. With the necessary amount of self-denial, perseverance, and steady work, however, success may be achieved through the evening courses, which are recognised by the examining bodies as equivalent to full-time day courses. For those, again, who are obliged to work at chemistry all day for a livelihood and feel themselves unable to carry through the studies requisite for a degree course, the National Certificates of Chemistry awarded by the Board of Education and the Institute are still open. Admittedly they are merely substitutes for something better, but they represent a minimum qualification in chemistry which is of some immediate

practical value and which may possibly be accepted later as part of the qualification needed for entry to the Institute.

While the facilities for these chemical studies in the London County Council area are attractively described in the official pamphlet, the difficulties to be overcome are not concealed. Included in much useful advice offered is the warning to the young chemist to beware of specialising too early and to remember that a three years course of pure chemistry is the minimum which will enable him to take up with success such special branches as the chemistry of brewing, of dyestuffs, of metals, etc.

Finely Divided Sulphur

THOSE of our readers who have experienced difficulties with the disintegration of rock sulphur, and who in the past have asked us to furnish them with particulars as to the best methods and the precautions to be observed, will be interested in a process for obtaining sulphur in finely divided form which has lately been patented in America. The ordinary process of grinding is always liable to be attended by fire or explosion, and, although the risk can be considerably minimised by conducting the operation in an inert atmosphere, there is usually the drawback that the powdered material formed is of widely varying degrees of fineness.

The American process avoids the use of grinding machinery altogether, utilising liquid and solid solvents, and it has the advantage that the degree of fineness may be varied at will, in accordance with the proportions of the solvents employed, from the exceedingly fine colloidal variety to a product of 100 mesh or less. The solvents used are naphthalene and toluene, and the sulphur is ultimately precipitated in a uniformly crystallised state and recovered by centrifuging. It is not possible to enter here into the details of the process, but the proportions of the solvents which must be utilised to give varying degrees of fineness, the temperatures of operation, and the means employed for recovering the solvents are all set out precisely in the specification which is U.S. Patent No. 1,497,649. Attention might also be directed to a specification relating to another process for obtaining finely divided sulphur by treating polysulphides, which appeared on page 306 of last week's issue.

Chemicals in Food

ONE of the most spirited attacks on the use of boric acid as a food preservative is made in *The Times* by Mr. A. G. R. Foulerton, of the Hygiene Department, London University College. He insists that boric acid is an "antiseptic," and not a "disinfectant" or germicidal drug. It merely inhibits temporarily the multiplication of bacteria; it does not destroy them. If used in sufficient concentration it checks and masks putrefaction and other modes of bacterial activity. The bacteria themselves remain alive, but in an inactive or dormant state. A sausage or pork pie, for examples, made from unsound meat which, although it contains objectionable bacteria, has not yet reached the stage of actual putrefaction, will remain inoffensive to the nose or eye if preserved with boric acid. When the food is taken into the stomach the boric acid becomes diluted, the antiseptic or inhibitory action of the drug is lost, and the hitherto dormant bacilli will resume their normal activity. All of which, if correct, is a little chilling to the appetite.

While Mr. Foulerton points with satisfaction to the prohibition of the use of boric acid as a food preservative in France, Italy, Holland, Spain and Germany, his satire is most pointed in the case of the United States, where Federal law, while prohibiting the inter-State transport of boricised food, provides that food products intended for export may contain added substances not permitted in food for inter-State commerce. "The American," Mr. Foulerton triumphantly concludes, "will not eat boricised bacon. France, Germany, and the other countries do not like it and will not have it. We remain the only people who are so foolish as to buy and eat the stuff."

Points from Our News Pages

A specially compiled article on the possibilities of South America as a market and statistics of our export trade (p. 318).

The results of original research in connection with the catalytic preparation of sulphur trioxide, of particular importance to those interested in the manufacture of sulphuric acid (p. 320).

Mr. W. P. Dreaper replies to Dr. M. O. Forster's letter on "Benzene and the Colleges"; Dr. Percy E. Spielmann writes on "Science and Plain English," and letters are published on "Chemical Purification of China Clay" (A. Worsley), and "A Chemical Student's Inquiry" (pp. 322 and 323).

Notes by air mail on the Cologne Fair (p. 323).

Recent works of interest to chemists are reviewed (p. 324).

A comprehensive survey of Sweden as an export market by the Consul-General for Sweden in London (p. 325).

Typical extracts are published from Sir Ernest Benn's new book, *Confessions of a Capitalist* (p. 326).

The death is reported of Lt.-Col. J. B. Gaskell, one of the original directors of the United Alkali Co., Ltd. (p. 339).

The London market is generally unaltered, but in some directions a better interest is being taken in forward buying. Prices are steady and export is quiet (p. 335).

Heavy chemicals are fairly satisfactory in the Scottish market. Prices for lead and zinc compounds are higher (p. 338).

Book Received

PHOTO-ELECTRICITY (Monographs on Physics). By H. Stanley Allen. London: Longmans, Green and Co. Pp. 320. 18s.

The Calendar

Oct. 1	Institute of Chemistry (Bristol and S.W. Section). Joint meeting with Society of Chemical Industry.	Chemical Department, Bristol University.
1 & 2	Faraday Society: General discussion on "Photochemical Reactions in Liquids and Gases."	Sir Leoline Jenkyns Laboratory, Jesus College, Oxford.
4	Société de Chimie Industrielle: Fifth Annual Congress.	Paris.
6	Institution of Petroleum Technologists: Conversazione 8 to 10 p.m.	Aldine House, Bedford Street, Strand, London.
6	Institute of Metals (Birmingham Section): "Some Phases of Life in India." Dr. F. Johnson. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
6	Institute of Metals (N.E. Coast Section): Chairman's Address, H. J. Young. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
8	Institute of Metals (London Section): Chairman's Address, Dr. J. L. Haughton. 7.30 p.m.	85-88, The Minories, Tower Hill, London.
8	Oil and Colour Chemists' Association: "The Need for Research in the Oil and Colour Industry." Dr. H. H. Morgan. 8 p.m.	8, St. Martin's Place, Trafalgar Square, London.

British Chemical Export Position

The Worth of the South American Buying

THE regularity with which we are able to present statistical totals of our export trade should not cause an undue relative importance to be attached to this side of business, but all the same the absolute totals of our annual exports of chemicals, dyes and colours, which vary in value between £16,000,000 and £17,000,000 per annum, are sufficiently attractive to merit attention. From time to time, moreover, an analysis of British world trade is very desirable if only to cast our thoughts for a moment beyond the home market, and at present some inquiry is necessary in view of the slight decline shown by the official returns of our trade as a whole.

To bring this point right down to date, the totals of exported chemicals for the first eight months of the current year, including the exports of dyes and colours, have amounted to just over £14,100,000, which compares with a similar export total for the same period of 1924 amounting to £15,200,000 and the comparative result of two years ago when almost £15,000,000 was recorded. An examination of these three totals on broad lines shows that only with dyes and colours has business been well maintained and that a falling off is common to almost all other sections. This may be but a temporary fluctuation in world-wide demands and certainly the reports from leading areas give that impression, but as an example of contrary conditions the position in the main countries of South America may be observed.

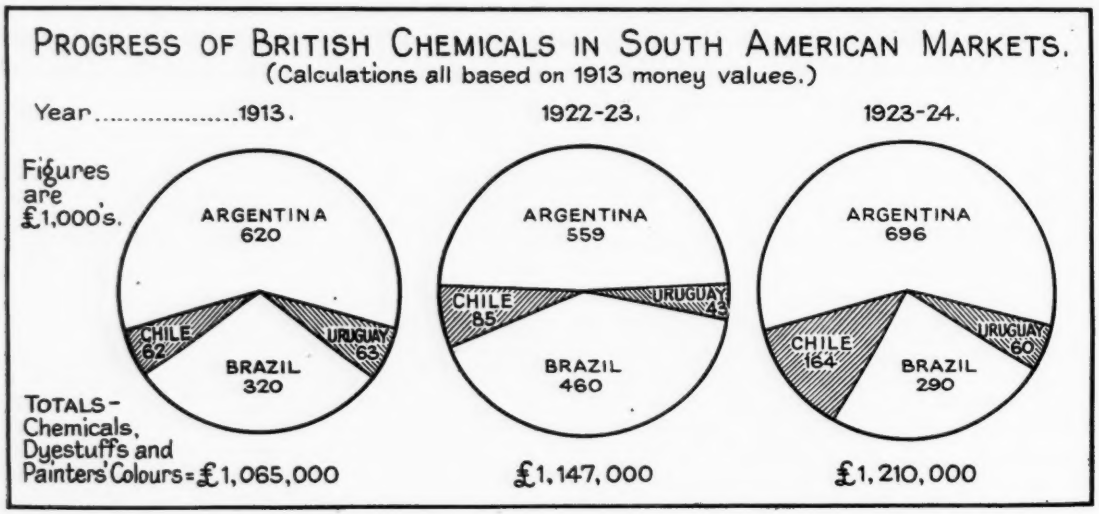
The South American Market

Here there are exceptional circumstances in the respect that the full totals for these countries have passed the pre-war standard and indicate the possibility of a general trend of increase. The expectation of better business for British manufacturers and shippers in this direction, as a tangible result of the Royal visit, makes it all the more worth while to inquire into their position as chemical buyers. Taken as a whole, South America ranks as one of our leading trade destinations and is now importing from us well over £2,000,000 worth of chemicals and allied products, or approximately 10 per cent. of our world exports. Generally speaking the local statistics of receipts in these countries are not as up-to-date as could be desired, but although this fact prevents an accurate portrayal in detail of the most recent operations, indications are not lacking as to the localised buying capacity.

Such figures as are available for each country deal in general with the twelve months ending with June, 1924, and from an association of these, by far the most important areas in South America are in the Argentine Republic, followed by Brazil, whilst quite useful business is also conducted with Chile and Uruguay.

Features of Argentine Trade

In the first diagram shown, strictly comparative results have only been possible by omitting our trade in oils, fats and resins and by showing the export trade in all other chemical products upon the same currency valuation as was existing in 1913. The recorded value of British exports was thus actually some 50 per cent. higher, and our total trade in all respects with the leading customers in the Argentine Republic, for example, was £1,243,000. This aggregate may be divided into the various sections of products, of which painter's colours figure at £416,000; oils, fats and resin at £199,000; leaving £628,000 as the value of all other chemicals, in which prominent totals



were shown by sodium compounds at £258,000 and disinfectants with insecticides amounting to £288,500.

The basic wealth of this market is vested, of course, in its agricultural and pastoral products, both of which are of world importance and not only represent the main buying power of the people, but also provide the key to our chemical trade with the country.

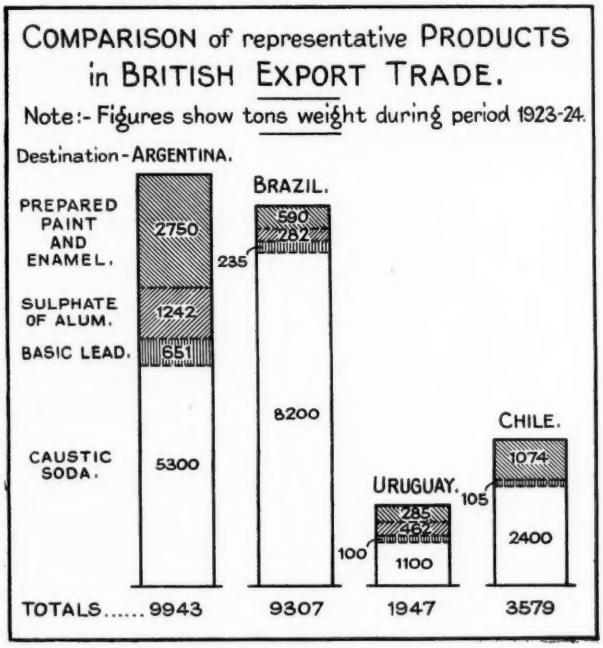
With the resultant demands for insecticides, cattle dressings and disinfectants, British manufacturers have a very commanding position, and, despite competition, have taken the bulk of custom. Generally speaking, we are supplying about 6,000 tons per annum to the Argentine Republic, and this is approximately four times the amount supplied by Germany, which ranks as our main rival. The latest year also indicates that we maintain as good a position as in 1913, and that, with our supplies in this period being valued at £288,500, there was an improvement of £23,000 over the business for the previous year. In this respect, therefore, there is cause for satisfaction, as Argentina is not only the leading destination in South America, but takes from us as much as all the other countries of the world combined.

Another section of business which also is doing well is that of sodium compounds. The year 1922-23 showed this trade at 22,300 tons and nearly 5,000 tons larger than in the preceding year, but the most recent figure is even better at 27,200 tons. This is made up of 5,300 tons of caustic soda, valued at £82,000, and 18,900 tons of sodium

carbonate together with 2,300 tons of silicate, these latter being worth respectively £149,000 and £17,400. In all these products, with the exception of caustic soda, the Argentine Republic is the main South American market.

For tartaric acid this country is our only customer in the continent, and also offers us an excellent opportunity for development. The latest total of British supplies gave a value of £13,600, but the position is by no means stabilised. These demands are notable, but represent only 132 tons, as compared with 243 tons in the immediate pre-war year. The movement as related to the year 1922–23 was in the right direction, but German competition was still effective, and the supplies from this source were in excess of our own.

British dyestuff exports to this country were fairly negligible, but compensation is to be sought for in our business with paints and colours of all kinds. This section has made highly important progress, and represents about double the trade in the latest statistical year that was recorded previously. All the South American countries



are good customers for these products, but the Argentine total of 8,200 tons is easily the best, and this position is reflected in every classification of the trade, with the one exception of Prussian blue. Some of the main items to be noted are over 2,000 tons of paints and colours ground in oil and valued at £93,000, prepared enamels of 750 tons by weight and £57,500 in value with 315 tons of ochre and earth colours valued at almost £8,000. The total paint and colour trade was thus worth £416,000 to British manufacturers in the period under review.

Another section of business in which the Argentine Republic stood well was that of oils, fats and resins. The total trade effected by British exporters of £199,000 was about double that of the other countries of South America taken together, and included some imposing totals for individual items such as £44,000 for lubricating oil and £61,700 for varnish.

The Position of Brazil

Inferior to Argentina in respect of the total chemical products imported and also for the quantities taken from Great Britain, Brazil occupied a place of importance as the only dye-importing country of South America, according to the latest statistics. Those purchased from Great Britain were valued in all at £5,500, and included £790 of alizarine, but this very probably is only the basis of development. A recent authoritative census has indicated the textile industry of Brazil as its leading activity, and with the anticipated recession of political difficulties will open up, even if slowly, a dye-trade worthy of careful attention. Competition in this connection is strong from Germany, whilst in other sections of chemicals U.S.A. manufacturers have shown activity.

For some commodities Brazil offers a larger market than the Argentine Republic, as, for example, with acetic acid, sulphuric and some other acids apart from tartaric One of the best sections is that of sulphate of copper, in which British manufacturers here effect a larger business than with any other South American country and of which our sales were 402 tons valued at £10,400, whilst the Argentine consignments were 354 tons with a value of £8,900. Brazil was, moreover, our only South American market for ammonium carbonate, bleaching powder and borax, the combined weight of these during the latest statistical year being 820 tons and the value over £20,000.

Trade in Sodium Compounds

The outstanding importance of this area from the point of view of British supplies is the business for various sodium compounds. These have shown a steady expansion since the 1913 total of 15,739 tons, to the 25,500 tons of 1922–23, and therefore the latest total of 15,500 tons represents a slight setback, and this reflects the movement with caustic soda, the main constituent in the sodium trade. Of this product, Brazil takes as much as the other South American countries combined, and turns to Great Britain for practically two-thirds of the trade. Our position before the war was that we were supplying about 7,000 tons per annum, and therefore the figure in the most recent twelve months of 8,200 tons is quite satisfactory, although somewhat below the total for 1922–23. Other sodium compounds for which this area is important are cyanide and silicate. With the former the latest figure of 230 tons worth £19,000 stands for three-quarters of our South American exports, whilst the silicate trade is the second largest in the continent and equal to 25 per cent. of the Argentine total.

Oils, fats and resins exported from Great Britain to this country reached an aggregate of £33,000, and although this was below the total of both the Argentine Republic and also that of Chile, Brazil was the second largest importer of lubricating oil worth £13,000 and took varnish valued at £12,800. As with the other areas of the continent Brazil has vast pastoral areas with an insistent demand for insecticides and cattle washes. The most recent imported value of the British supplies in these products reached about £26,000, and the movements of the past few years indicated that quantities are on the increase. By 1922–23 we were exporting to this part 250 tons, after the total in 1913 had amounted to only 84 tons, but in 1923–24 our supplies had mounted to 465 tons. Outside competition from other sources is perhaps even keener with chemical manures, for which Brazil offers a very desirable market. Annually some 4,000 tons are required and of this British supplies are about 200 tons. Continental competitors, and especially Germany, are supplying potassium nitrate, of which our trade has now amounted to £8,000, whilst superphosphate is another section of rivalry.

Painters' colours in Brazil do excellent business, and British products imported are now valued at £98,000, which figure includes £18,000 of prepared enamel, £3,000 worth of white lead, and £12,000 of oil paint. The total weight of the whole of this section is still 1,800 tons, or about the same as in the previous year, and a comparison with the pre-war year's quota of 3,477 tons suggests a capacity far greater than our existing trade.

Export work in this continent is therefore making definite progress and offers every encouragement to further effort.

The Catalytic Preparation of Sulphur Trioxide

The following is an account of some original work in connection with the formation of sulphur trioxide, using ferric oxide as a catalyst, which was undertaken by a well-known research chemist who has sent us his results for publication. The experiments conducted and the conclusions arrived at should prove of considerable interest to those associated with the manufacture of sulphuric acid and oleum.

ALTHOUGH platinum is by far the most common agent for the preparation of sulphur trioxide by the contact process, ferric oxide is also used to a certain extent, notably in the Mannheim Plant. The object of inserting this process before the gases pass over the platinum is partly to effect an economy in platinum and partly also to remove the arsenic which is always present to some extent when the sulphur dioxide is obtained by the roasting of pyrites. The arrangement commonly employed is to pass the hot gases from the pyrites burners up a shaft filled with iron oxide in the form of pyrites cinders, that is, the residue left after the burning of the pyrites. At intervals, generally daily, some fresh oxide is added at the top of the shaft and an approximately equal amount raked out from the bars at the bottom. When the gases emerge from the oxide shaft, the sulphur trioxide is removed by absorption with sulphuric acid (oleum being formed), and the residual gases, after being filtered through coke or quartz, are sent to the platinum catalyst, which causes the oxidation of the remainder of the sulphur dioxide.

The following factors may influence the conversion of sulphur dioxide into trioxide :—

I. The percentage of sulphur dioxide in the entering gas.
II. The presence or absence of moisture in the gas.
III. The chemical composition of the catalyst.
IV. The temperature at which the reaction takes place.
V. The state of division of the catalyst.
VI. The amount of sulphur dioxide passed per hour over unit weight of the catalyst.

In the experiments to be described, it was, of course, impossible to reproduce in the laboratory the exact conditions obtaining on the plant, though as near an approximation to these as possible was obtained. The proportion of sulphur dioxide in the gas from the burners is usually between 5 and 6 per cent., and a mixture of this composition was used in most of the experiments. The temperature at which the reaction takes place most satisfactorily is known to be between 600° and 700° C. This was, therefore, adopted as the standard temperature.

Effect on Oxide of Iron

The principal object of the following experiments was to trace the chemical changes undergone by the iron oxide during the reaction, with a view to ascertaining whether such changes are injurious to the iron oxide as a catalyst ; also the influence, if any, of the presence of moisture in the gas on the conversion, or on the catalyst, or on both. The iron oxide as it is put into the shaft is by no means pure ferric oxide, and contains a number of substances which might conceivably interfere with catalytic action.

It was not, of course, possible to use the oxide in the form of large lumps as is the case on the plant, so a finely powdered material was used. This naturally tends to give a higher conversion, but the effect was to some extent counterbalanced by passing the gas mixture over the catalyst at a rate considerably greater than that employed on the plant. In the Mannheim plant, as an average figure, in one section in twenty-four hours, six tons of pyrites (sulphur = 50 per cent.) are fed into the burners ; the weight of oxide in the four shafts being 26 tons. This is equivalent to a figure of 6·73 litres of gas containing 5 per cent. of sulphur dioxide passed over 100 grams of catalyst per hour. In the laboratory, the rate of flow of gas was kept very constant at about 16 litres per hour over 100 grams of oxide. Thus, although the conditions for laboratory experiments cannot be exactly those on the plant, these experiments furnish results strictly comparable among themselves and give indications of what takes place on a larger scale.

In order to save space, a detailed description of the apparatus used will not be given here. It consisted of (1) a device for obtaining a stream of gas of any desired composition ; by this means, the proportion of sulphur dioxide and air in the entrant gas could be kept very constant over a considerable period ; (2) an apparatus for analysing simultaneously the entrant and exit gases ; (3) an electric furnace by means of which the tube containing the catalyst was heated ; and (4) an electric pyrometer, reading up to 900° C., graduated in 10 degrees.

The calculation of the percentage conversion is simple. If the percentage of sulphur dioxide in the entrant gas be denoted by a, and the exit gas by b,

$$\text{Percentage conversion} = \frac{100\,(a-b)}{a(1-0{\cdot}015b.)}$$

In the experiments 1 to 7 quoted in Table 1, the air used was carefully dried by means of calcium chloride and strong sulphuric acid. During these experiments a continuous test was made estimating the moisture of the air, with the following result :—23,710 c.c.'s of the air were aspirated through a tube containing phosphorus pentoxide, the weight of which increased by 0·0011 gram ; hence, 100 litres contained 0·0046 gram of moisture.

TABLE 1.

Experiment.	Temperature.	Per cent. SO_2 in entrant gas.	Per cent. SO_2 in exit gas.	Per cent. Conversion.
1	610	4·34	4·81	—
2	620	5·02	3·08	40·5
3	600	5·00	2·92	42·7
4	660	5·10	2·56	51·8
5	670	5·35	3·03	45·2
6	640	4·59	2·44	48·6
7	600	6·66	3·76	46·2
			Average	45·8

In experiments 8 to 14 given in Table 2, undried air was used ; during these experiments 13,450 c.c.'s of air were passed over phosphorus pentoxide and were found to contain 0·0416 gram moisture, that is 0·3081 gram in 100 litres.

TABLE 2.

Experiment.	Temperature.	Per cent. SO_2 in entrant gas.	Per cent. SO_2 in exit gas.	Per cent. Conversion.
8	670	4·30	8·24	—
9	630	5·19	2·61	51·7
10	670	5·13	2·31	56·9
11	620	5·35	2·60	53·6
12	650	4·83	2·40	52·2
13	630	5·06	2·54	52·2
14	630	5·08	2·35	55·7
			Average	53·7

The original pyrites cinders and the residues left in the tube after the two series of experiments quoted above were analysed as exhaustively as possible, with the results given in Table 3.

TABLE 3.

	Original material.	Residue from Experiments 1—7.	Residue from Experiments 8—14.
Total Iron	56·64	57·23	57·54
Total Sulphur	5·66	2·39	2·14
Total Copper	·79	·79	·80
Ferrous Iron soluble in water	·40	·27	·22
Sulphur soluble in water	1·10	2·34	2·00
Copper soluble in water	·79	·55	·70
Sulphur as ferrous sulphide	·29	·06	·14
Silica, etc.	11·20	11·10	11·13
Moisture	·92	—	—

The figure for ferrous iron was obtained, of course, by titration with permanganate. The total soluble iron was estimated but gave a figure for ferric sulphate rather lower than that which would be expected from the figure for soluble sulphur after the sulphur in copper and ferrous sulphates had been deducted. This is due to hydrolysis of ferric sulphate, and the percentage of this salt present is, therefore, calculated from the sulphur figure.

From the above figures, the proximate compositions can be given as follows :—

TABLE 4.

	Original material.	Residue from Expts. 1-7.	Residue from Expts. 8-14.
Ferric oxide	73·57	78·12	79·09
Ferric sulphate	1·95	7·90	6·32
Pyrites	7·99	—	—
Ferrous sulphate	1·09	·73	·60
Ferrous sulphide	·80	·14	·38
Copper sulphate	1·98	1·38	1·76
Copper oxide	—	·30	·13
Silica, etc.	11·20	11·10	11·13
Moisture	·92	—	—

The original material contained 0·02 per cent. of arsenic.

It is seen that when ordinary pyrites cinders (which invariably contain some sulphide left unburnt) are used as a catalyst the two chief changes produced in the ore are (1) the roasting out of practically all the sulphide present, and (2) the production of a certain amount of sulphate.

The first change is well shown by the figures obtained in experiments 1 and 8, in which, with fresh pyrites cinders, the exit gas actually contains more sulphur dioxide than the entrant gas. This accounts, in the writer's opinion, for the observation of chemists with experience of the Mannheim plant, that the insertion of a fresh quantity of burnt ore into the oxide shaft reduces the conversion for a time, for naturally any increase of the sulphur dioxide content of the exit gas caused by roasting sulphur out of the ore will make the percentage conversion appear less than it really is.

Formation of Sulphate

The formation of sulphate is very marked. Starting with 2 per cent. of ferric sulphate in the original burnt ore, this rose to 8 per cent. after treatment with dry air and to 6 per cent. with moist air. It is quite easily understood that the presence of moisture at 600° would be unfavourable to the existence of ferric sulphate, as it would tend to be decomposed according to the equation :—

$$Fe_2(SO_4)_3 + 3H_2O = Fe_2O_3 + 3H_2SO_4$$

There can be no doubt that the conversion in experiments 1 to 7 is better than that in experiments 8 to 14. It is possible that this difference of some 8 per cent. in the conversion may be due to the greater amount of ferric sulphate in the catalyst which gave the lower conversion. It certainly seems that a moderate amount of moisture is not harmful to conversion in the oxide shaft. On the other hand, it may be useful, in that it tends to decompose the ferric sulphate formed.

It must be realised that each of these series of conversion experiments occupied only three or four days, and that the changes in the catalyst were produced in that comparatively short time. Taking the weight of oxide in one shaft as 6·5 tons, and the amount put in per day as 150 lb., it is seen that the average length of time that the oxide remains in the shaft is 97 days. It is not argued that the iron oxide would be completely converted to sulphate under any conditions, but the percentage attained might certainly be greater on the plant than in laboratory experiments.

Some further information on this subject was obtained from the examination of ten samples taken at the same time from different depths of the same oxide shaft. No. 1 was taken from the top, No. 10 from the very bottom, and the others at 6 in. intervals.

TABLE 5.

No. of Sample.	% Total Sulphur.	% Soluble Sulphur.	% Ferric Sulphate.	% Arsenic.
1	4·55	1·87	7·8	0·35
2	4·38	2·31	9·6	0·35
3	4·57	4·30	18·0	0·35
4	3·27	3·02	12·6	0·36
5	1·90	1·87	7·8	0·36
6	1·80	1·65	6·9	0·39
7	2·02	1·90	8·0	0·67
8	2·06	1·99	8·3	0·72
9	1·74	1·56	6·5	0·72
10	3·00	2·26	9·4	1·39

It is seen that at the top of the shaft the total sulphur is greatest, as would be expected ; the temperature there is generally about 500-550°, becoming greater further down, until at the bars it approaches 700°. The sulphate content is not at its maximum until about a foot down, when it reaches the very high figure of nearly 20 per cent. Nearer the bars in the hotter regions there is less sulphate. These facts support the theory that the formation of sulphur trioxide is caused by the alternate formation and decomposition of ferric sulphate. It must not be forgotten that the conversion of sulphur dioxide into trioxide is not the only function of the oxide shaft. It also acts as an arsenic trap, to retain the arsenic burnt out of the pyrites.

Distribution of Arsenic

It had been the intention of the writer to determine the best conditions for the absorption of arsenic by pyrites cinders, but the difficulties of obtaining a stream of gas containing a very minute but constant quantity of arsenic were so great that the conditions bore no relation to those obtaining on the plant, and the experiments were abandoned.

Reference to Table 5 shows the distribution of arsenic in the oxide shaft. The results are precisely those which would be anticipated, with the highest arsenic content in that ore which is hottest and which has been longest in the shaft. It was found possible to isolate the arsenical compound by first washing the material well with water and then with dilute acid, the latter washings being kept. On adding ammonia in insufficient quantity to neutralise the liquor, the arsenical compound was precipitated as a fawn-coloured powder. After drying it gave on analysis—

Fe_2O_3 ..... 58·9 per cent.
As_2O_5 ..... 40·7 per cent.

The compound $As_2O_5 2Fe_2O_3$ would contain Fe_2O_3 58·2 per cent. and As_2O_5 41·8 per cent. This is probably the compound that is formed when arsenic is absorbed in the oxide shaft.

In order to determine whether the presence of arsenic in the oxide is harmful to conversion, experiments 15 to 21 were performed with ore containing 1·39 per cent. of arsenic.

TABLE 6.

Experiment.	Temperature.	% SO_2 in entrant gas.	% SO_2 in exit gas.	% Conversion.
15	650	5·01	3·04	41·2
16	650	5·28	3·11	43·1
17	660	5·22	3·09	42·8
18	670	5·19	2·87	46·7
19	720	6·19	3·25	49·9
20	740	6·20	3·51	45·9
21	830	5·40	4·21	23·5
			Average (excluding 21)	44·9

These experiments indicate that the presence of arsenic tends to lower the catalytic value of the oxide slightly, and a higher temperature is needed for the conversion. It is, perhaps, fortunate that the hottest part of the oxide shaft is where the arsenic content is highest.

Conclusions

The following conclusions may be drawn from the experiments described above :—

(i) Pyrites cinders undergo a considerable number of changes in the oxide shaft. Sulphides are roasted to sulphur dioxide, and considerable quantities of sulphate may be formed.

(ii) Moisture in the gas mixture is not harmful in moderate quantity ; on the other hand, it appears to have a beneficial effect, probably owing to its hydrolytic action on iron sulphate.

(iii) The arsenic when absorbed forms a compound having the composition $2Fe_2O_3, As_2O_5$.

(iv) The presence of arsenic in the ore involves a higher temperature for good conversion.

New Tar Works

THE Tarmac Co., Ltd., of Darlington, are reported to have in contemplation new works at Skinningrove for the manufacture of tar slag for road making.

Negotiations for the acquisition of a site of 100 acres are understood to be well advanced, and it is expected that the work of erection will be commenced at an early date. For part of its supply the firm will quarry large slag heaps adjoining the Skinningrove ironworks, and arrangements have been made to utilise the slag products from the blast furnaces in operation at Pease and Partners Skinningrove undertaking. The new factory, which is expected to be ready within twelve months, will involve the expenditure of many thousands of pounds.

Benzene and the Colleges

To the Editor of THE CHEMICAL AGE.

SIR,—When I ventured to link certain aspects of modern chemistry with professional football, I had no idea that my old friend Dr. Forster would so promptly "kick off" from Bangalore. In his following play he seems less certain, sometimes playing on one side and then on the other. For instance, when he makes the amazing statement that he left for India to escape one aspect of professionalism, he certainly goes farther than I ever suggested. It is interesting to note that the men whose display he so strongly objects to must have been trained under the system he so vehemently upholds and honestly believes in as being the only possible one in practice in this country.

It may be that he, too, has not properly visualised my proposals, and that on further thought may realise that if students are working in groups there will be plenty of problems under investigation at any one time, and that this will in practice take the place of "a problem sufficiently perplexing to maintain the teachers' interest" as well as the students'. He may see that I had this difficulty in mind when the proposal was first put forward. He might think this over.

I can assure him that in the practical side of chemistry there is a never-ending interest in a process which entails operations which constantly vary and react upon other operations in spite of the most carefully worked out scientific control. Surely it is possible to select in time similar cases for class research which would keep the student's interest in addition to the psychological one engendered by the fact that they were closely following the original lines followed by a well-known investigator, as this would be indicated by the teacher from his own experience, or by actual fact.

To-day a considerable amount of research consists of the equivalent repetition of research already undertaken and the finding out of errors in practice or theory or of points previously overlooked. That the personal interest is important is seen in Dr. Forster's visualisation of a ride down the Clapham Road, where he adds open-air treatment to the routine of college laboratory practice.

Dr. Forster strangely overlooks my main contention (except where he seems to support it), viz., that the present system of teaching chemistry breeds professionalism, and to this extent nullifies the controlling influence of practice. After all, professionalism is a poor substitute, and is often a stumbling-block to real progress. In extreme cases it may, in time, destroy all practical interest in work.

If Dr. Forster will reconsider his present position and return to the land of his fathers, I will undertake, if he so desires, to arrange that he shall spend two years in a modern works, and will guarantee that at the end of this time his view will be subject to material modification. If he insists, he may not even attend the meetings of the Chemical Society, for this will not be an essential condition to the success of this experiment.

His best friends deeply regret the absence of so versatile a chemist and will one and all welcome his return. His place is in the House of Commons, where he would undoubtedly render the greatest service to his country. Besides, there is always that ride down the Clapham Road.—Yours, etc.,

Hampstead Heath, N.W.3, W. P. DREAPER.

Chemical Purification of China Clay

To the Editor of THE CHEMICAL AGE.

SIR,—In the China Clay Section of your issue of September 19 there is an article by E. J. L., dealing especially with oxides of iron in clays and in the water used for washing clays.

There is no difficulty whatever in removing iron stains from clays, but there are economic limitations to chemical purification. Operators of clay setts have to supply their clients, and their clients do not always order the various grades of clay in the same ratio as such grades occur in the setts. Hence, operators often become overstocked with some grades of clay and short of other grades. Selective mining of some particular grade is not always feasible, and generally adds to the cost of operation. In some cases operators on the best setts find a difficulty in marketing their white clays of the highest grade at a speed which keeps pace with the sales of lower grades. Such operators will not look at any proposal to spend money on purifying the grades which they can sell unpurified.

The next limitation is also purely economic. Although it does not cost more than a few shillings per ton treated to remove iron stains from good-grade China Clays, yet this few shillings represents the difference in value between the best grade and the grade just below it. Hence, it would not be economic to turn grade B into grade A by treatment. Now, if one treats lower grades such as C, D, etc.—clays still more heavily stained—the cost of treatment will rise with the amount of iron to be removed. It is also sometimes the case that such clays, however white they may become after treatment, only produce a part of their total content which is in the same state of physical fineness as is the best China Clay.

Thirdly, there is the fact that the market for the highest grade of pure white, "semi-colloidal" clay is limited, and would be quickly overstocked if everyone purified their high-grade clays. But, for the reasons just given, this will not take place.

There are many operators of clay lands who are working in clay of very good physical character, but none of which is naturally white; there are others troubled with water holding iron. And, in this context, there are some clays which, although white before the air has had long access to them, contain elements which oxidise under atmospheric conditions, and then show stain. Operators of such clays should purify chemically.

For two years some smaller operators have purified their clays chemically and obtained pure white clays from stained clays in England, but the big operators seem very conservative, and the Cornish firms show no interest in what is being done elsewhere. I have had clays sent to me from overseas, some of which were actually yellow, but which were returned to the senders pure white and free from iron. In America, chemical purification of clays is making rapid headway, and if, in coming years, we retain our export trade it will not be on account of the superior whiteness of our clays, but solely on account of their physical properties, in which respect Cornish China Clays are probably supreme.

The same process is applicable to barytes. In this mineral we once held a monopoly. Now we import largely from countries which have kept abreast with modern knowledge.—Yours, etc.,

A. WORSLEY.

Mandeville House, Isleworth,

"Science and Plain English"

To the Editor of THE CHEMICAL AGE.

SIR,—Pray be so good as to cede to me a little of your space in order that no misunderstanding shall arise from the comments on my letter to *The Observer* which you were good enough to notice.

1. I would make it quite clear that my remarks about reporters and their responsibilities were connected with the kind of treatment of scientific news that is too often to be seen in the popular Press, not with that in "some of our more responsible dailies," whose attitude is unquestionable.

2. I plead for the proper introduction of scientific news to the public by professional journalists only until Sir Richard Gregory's 'expositors" become an established reality. In my opinion, a scientific expert with a journalistic "streak" writing on matters well within his knowledge would be of greater service to both sides than a journalist who has to do his best with the latest scientific advances at the editorial behest.—Yours, etc. PERCY E. SPIELMANN.

The Athenæum, September 19.

A Chemical Student's Inquiry

To the Editor of THE CHEMICAL AGE.

SIR,—I should be obliged if you or any of your readers could give me some information on the following points:—

(*a*) What type of work should be taken up by a student after graduating at a College in chemistry, in order to enter the chemical engineering profession?

(*b*) Is it possible, while in a situation, to obtain enough experience in chemical engineering methods to fit oneself for a better position, or is it essential to take a post-graduate College course in the subject before applying for a position?

(*c*) What prospects are there of finding a situation of the type referred to in the coal-tar distillation industry in this country?—Yours, etc., ENQUIRER.

The Cologne Technical Fair.

[By Air Mail from Our Special Correspondent.]

Cologne, Wednesday.

From the point of view of the chemist the Cologne Fair, which was officially opened to-day, is disappointing, and the trade does not appear to have taken advantage of the exhibition. It might have been supposed that a technical fair of the size of that now being held here would have afforded an opportunity for chemical concerns to advertise and display their products, but with the exception of a section devoted to pharmaceuticals, drugs, cosmetics, and other toilet articles, there are no chemical exhibits.

A very large part of the fair is given over to housing, where not only building materials and labour-saving devices are displayed, but curtains, carpets, rugs, etc., are featured; coupled with this there is a large showing of textiles, and it is a little surprising that dye manufacturers have not taken the opportunity to give demonstrations of the applications of their products, nor even to exhibit their colours for the benefit of those engaged in the textile industry.

Having regard to the fact that the chemical trade is such an important part of Germany's industry, it is surprising that it is virtually unrepresented at a fair of this importance. The absence of chemical exhibits, however, is in some way compensated for by a display of measuring instruments of all kinds and for particular use in industrial processes. The manufacture of scientific instruments has always been an industry of the first importance in Germany, and the trade has taken full advantage of this exhibition to advertise its products. Instruments for measuring temperature, pressure, and the other physical units are fully exhibited, and one of the features of the display is a number of these for especial use in research laboratories.

The Cologne Fair is of little significance so far as the chemical trade is concerned, and in this respect follows the Leipzig exhibition, which ended about a fortnight ago.

The Value of Research

Presidential Address before the Ceramic Society

On Thursday, September 17, Mr. J. H. West delivered his Presidential Address at the annual meeting of the Refractories Section of the Ceramic Society (see The Chemical Age, September 19).

After referring to the growth in membership of the Society (now 676) and expressing the wish that it would reach a total of 1,000 in the near future, he took as his special theme the value of research. The British Refractories Research Association, he said, of which the Ceramic Society was one of the principal sponsors, had just completed its first five years of existence, and had been in negotiation with the Government for a grant for a further limited period, to enable it to establish itself as a self-supporting organisation. Much of the work of the Association had of necessity been spade work, and full advantage of it would only be gained if the Association was able to continue its activities. If satisfactory support was not forthcoming from manufacturers and users, the Government grant would be discontinued. Even in these enlightened days there were some who looked with suspicion upon research instead of regarding it as an essential adjunct to competitive industry.

There was no uniform raw material in the manufacture of refractories, and the products were not standardised by composition, but were judged by their performance. The individual manufacturer must take the particular clay at his disposal and, by modifying his processes, make the best of it. Thus research was very necessary. Also industrial developments of the future would inevitably call for improved performance of refractories. Already they heard of the construction of boilers to operate at greatly increased pressures, and cheap oxygen might appear at any time to be utilised in metallurgical operations. In either case refractories of exceptional properties would be required, and only by research could the refractories industry put itself in a position to meet the demand.

As an example of the usefulness of research, Mr. West said that the gas industry could not have made such rapid strides but for the improved refractory materials, due chiefly to special investigations and research by the Ceramic Society and kindred bodies. A few years ago a gas engineer was satisfied if he obtained 1,000 days' life out of his retorts at moderate heats, but now the heats were considerably increased, giving larger makes of gas, and this was due to progress made by refractories manufacturers.

The important question of erosion of refractory materials, both in the gas and coke oven works, was not yet cleared up, but it was becoming by research, and a process of elimination, more understood, and if such important investigations were allowed to continue, the problem must in the end be solved. Finally, he ventured to suggest that research was the only thing which would assist the home country to combat foreign competition.

Speaking of the work of the Society and the value of the visits made to various works, the President expressed satisfaction that the prejudice amongst manufacturers against visiting competitive works and meeting together had almost disappeared.

Chemistry in the Service of Man

Sir John Brunner's Address to Rotarians

"Nowhere in the world has chemistry, particularly where it merges into physics, taken greater steps forward than in Great Britain during the last few years," said Sir John Brunner in a talk on "Chemistry in the Service of Man," to the Liverpool Rotary Club, on Thursday, September 17. Sir John gave many striking illustrations of the importance of chemistry in everyday life.

The theatrical limelight of our youthful days, he said, had literally gone long ago. About 1880 uneasiness was caused to gas shareholders by the advance of electric lighting. It was Auer von Welsbach's invention of the gas mantle in 1893, aften ten years' experimenting with rare metals, that saved the gas industry. It had not reduced our gas bills because everybody now demanded more light, but indirectly it had made gas cheaper, as it was now sold for its heating and not for its lighting value.

Gases whose existence was unsuspected only thirty years ago now added greatly to our enjoyment of life. Helium had found a use as a filling for thermionic valves for wireless purposes and for gas arc lamps and also neon, which emitted a brilliant crimson glow under low pressure with an electric current, was used in illuminated signs. Argon was manufactured in large quantities from air to fill the well known "gas-filled" lamps.

Referring to the advances in photographic science, Sir John said that it was English workers who could claim credit for the best work done to make photography quicker, more accurate, and cheaper

Improving on German Methods

Speaking of modern methods of producing soda, a raw material for a variety of industrial, medicinal, and water purification purposes, Sir John claimed that Solvay and his collaborators in the ammonia-soda process had been benefactors to mankind by producing a cheap and pure source of soda. The present price of soda was less than half that of fifty years ago, in spite of the rise due to the war. Turning to ammonia production, Sir John said the latest process, known as nitrogen fixation, was highly developed in Germany before the war, and enabled the Germans to obtain all the nitrogen they wanted for their explosives in the war, whereas Great Britain had to depend almost entirely on Chilian nitrate. To-day we had much improved on the German methods. "Our new works at Billingham, near Stockton," said Sir John, "are now turning out over 100 tons of sulphate of ammonia a day. The country is now no longer dependent on oversea supplies of nitrogen for war purposes, and a valuable and ever more necessary fertilising agent is available in times of peace."

Until quite recently a good hard soap could be produced only from hard fats, but by long-continued research work soap chemists were now enabled to harden the cheaper liquid oils, such as linseed, cotton-seed, and peanut oils, while marine animal oil could also be refined and hardened. Although the difference between the prices of hard and soft fats now hardly made the process pay, it was a fact that soap would have been very scarce and dear during the war and after if the chemists at Crosfield's had not brought the process to a technical success.

Reviews

THE TECHNOLOGY OF WOOD DISTILLATION. M. Klar. Translated by A. Rule. London: Chapman and Hall. 496 pp. 25s.

It may be assumed that the majority of those engaged in the wood distillation industry the world over, as well as many others less directly interested, are already familiar with Max Klar's *Technologie der Holzverkohlung*, since it was for many years the standard work on the subject. Dr. Rule has now translated it into English, thus rendering its contents more readily accessible. It is somewhat surprising that the translation has not been undertaken before, having regard to the status of both the book and its author.

Both the text and arrangement of the original have been closely adhered to. The translator has avoided the pitfalls so common to the task; no liberties have been taken with the text, which is eminently clear and readable. Indeed, in this respect it is a marked advance on the original and is a model of what a translation should be. Additions include a short chapter on recent advances, in which there are, however, some notable omissions; flow sheets for the production of acetone and methyl alcohol; and a short account of the production of iron liquor. The subject matter has been enriched by the inclusion of additional references to the literature, and the opportunity has been taken to rectify the rather numerous arithmetical and other errors in the calculation of data. The book is well printed and typographical errors are conspicuous by their absence. Dr. Rule has rendered a most useful service to the wood distillation industry at a time when it is facing a serious crisis in its history.

H. M. B.

SMOKE: A STUDY OF TOWN AIR. By J. B. Cohen, F.R.S., and A. G. Ruston, D.Sc. Second Edition. London: Edward Arnold and Co. Pp. 108. 8s. 6d.

This book deals with the smoke problem in its relation to the growth of vegetation and to the disintegration of the stonework of ancient buildings, and contains the records of observations made at intervals during a considerable period of years. The authors are respectively professor of inorganic chemistry and lecturer in the department of agriculture at the University of Leeds, and have had unique opportunities of studying this problem in what is primarily an industrial city. With regard to buildings, it is found that the soot in town air is generally acid and its adherence to bodies and subsequent moistening by rain tends to bring about their corrosion. The average amount of soot passing up chimneys represents a total loss for the whole country of 2,420,000 tons per annum. The average amount of insoluble matter carried down by rain or otherwise deposited in London was 194 tons per square mile for the years 1922–3, and when such figures as these are quoted throughout the book, the reader is reminded that the smoke problem is a very real one.

J. A. B.

KOLLOIDCHEMIE (in German), Vol. 1; by R. Zsigmondy. Fifth Edition, pp. 242. Leipzig: Otto Spamer, 1925 11 marks (unbound); 13.50 marks (bound).

Colloid chemistry cannot be considered a scientific pastime: millions of gallons of emulsions are annually produced, whilst colloidal solids, such as colloidal clay, silica gel and activated carbon, command increasing sales by virtue of their many uses. Therefore one is justified in expecting that, in a large scientific work, the technical sides of colloid chemistry would at least be mentioned and that the theory of industrial applications would be dealt with adequately. Far from it; only certain emulsions containing a very small percentage of oil are described. In no other treatises of theoretical chemistry are the essential facts of life being so utterly disregarded. In this book the colloid mill is just mentioned, but as a scientific toy; although in the United Kingdom alone some 400-500 colloid mills of various makes are in use and probably an equal number of homogenisers, such as Gaulin's and Bennett Sons and Shears'; yet a passing mention on pp. 46 and 48 of the Plauson Mill is the only one in a volume which professes to be a text-book of colloid chemistry and is written by an acclaimed leader in the science. In all other branches of chemistry, scientific studies and literature have kept abreast with technical development; surely the same should be possible in the study of colloids. We must, however, admit that Professor Zsigmondy is certainly not the worst offender. Nevertheless, the greater the writer, the less pardonable are such omissions. The theoretical part is handled very well indeed and his treatment of the subject is more business-like than that of many other exponents. He indicates facts, gives tables, graphs and plates which help to visualise the present state of academic colloid chemistry. The book is written in a facile style with brief sentences, which will be appreciated by non-German readers, and is up to date within the limits mentioned. One of the valuable features of the book is the tendency to differentiate between purely physical and chemical phenomena and explain by chemical ideas those which fall under the heading of chemical reactions. In this respect Zsigmondy keeps himself aloof from a certain group of scientists who try to "explain" as much as possible merely by smart phraseology. By contrast this volume forms pleasant, refreshing and useful reading.

S. P. S.

THE FATS. J. B. Leathes and H. S. Raper. London: Longmans Green. Pp. 242. 12s. 6d.

The second edition of this volume, in the well-known series of "Monographs on Biochemistry," edited by Plimmer and Hopkins, appears at a time when much general interest is being evinced in the chemistry of the oils and fats. The volume meets an acute need in dealing, in seven of its ten chapters, with the physiological chemistry of fats, and this it does in a very lucid and satisfying manner. In the reading of these chapters one gathers that the authors have exercised the greatest restraint in exposition, and have carefully sifted the voluminous literature of the subject to present their conclusions with the nicest regard for the value of the chemical evidence before them.

That the volume will be of great interest and value to the chemist who is seeking information on the physiological side is obvious, while the physiologist will derive a clear insight into the chemical nature of the physiological processes in which the fats are involved. But that the physiologist or the general chemist will find a flawless and up-to-date account of the general chemistry of the fats in the first chapter is, unfortunately, not to be expected. The main defect of this part of the book is the neglect of the more modern work on the subject, and this leads the authors at times to pass over important and relevant facts, at other times to make inaccurate statements. There is now no doubt, for example, that the method of oxidation of unsaturated acids by permanganate, as described on p. 21, and the method of catalytic hydrogenation on p. 23 are not the best methods that have been devised. Moreover, arachis oil and maize oil are given as sources of hypogaeic acid, but two independent groups of workers, publishing the results of exhaustive analyses in 1923 and 1924, fail to find any hypogaeic acid. Two independent groups of workers in January, 1924, reported in whale oil three times as much palmitoleic acid as had previously been found by Bull in cod liver oil. Whale oil is therefore deserving of mention as a source of this acid.

There are four other important omissions. On p. 35 chaulmoogric and hydnocarpic acids are described, but no mention is made of their optical activity and its bearing upon constitution. Important work has been carried out during the past ten years on the isomerides of oleic acid produced during partial hydrogenation of various oils, but this finds no mention. Again, tariric acid (by typographical error in text and index given as *tairiric* acid), described on p. 29, has now been assigned to the stearolic group (triple bond). On the physiological side one is surprised to find that so very little use has been made of the now well authenticated work on vitamins; the only paper on this subject given in the bibliography is one of the earlier publications of Drummond, and the only use made of it in the text is a quotation of data relating to marasmus in rats. On p. 27 erucic acid is stated to be "converted by nitrous acid into the solid brassidic acid," although erucic acid is itself solid, melting at 33°–34° C. On p. 26, line 21, there is a somewhat confusing and unnecessary inversion in the system of describing the constitution of the unsaturated acids, and it is not until 16 lines further on that we are told that, this time, the position of the centre of unsaturation is reckoned from the "unoxidised end of the molecule." The statement on p. 5 that the saturated fatty

acids of higher molecular weight than myristic " pass over in a current of steam—barely even in traces," is not correct.

The arrangement of the subject matter is excellent, and on the whole the volume forms a stimulating supplement to the existing treatises on the chemistry of the fats. A greater value would attach to the bibliography if numbers were appended relating to references in the text.

W. W. M.

Sweden as a Market

How to Increase British Export Trade

In dealing with Sweden as a market one might conveniently begin with the relative importance of the three principal ports, Stockholm, Gothenburg and Malmö. In terms of shipping, that is, vessels arrived and departed, Gothenburg had in 1923 a turnover of 8,400,000 tons net; Stockholm came next with 6,700,000 tons, and Malmö third with 4,700,000 tons. On this basis Gothenburg is, therefore, 25 per cent. larger, as a port, than Stockholm, says Mr. E. G. Sahlin, consul general for Sweden in London, writing in the *Manchester Guardian Commercial*.

The dominating position of Gothenburg is further shown by the fact that in 1923 the weight of incoming and outgoing goods reached 2,500,000 tons, while corresponding figures for the other leading ports were as follows :—Stockholm, 1,675,000 tons; Malmö, 641,000 tons; Gefle, 575,000 tons, and Norrköping, 462,000 tons.

Dealing with quantities, it is natural that coal and coke should form the bulk of imports. In 1923 Gothenburg imported 864,000 tons of these commodities, or 60 per cent. of the total tonnage discharged at that port. To Stockholm went 792,000, or 57 per cent. of its total imports, while Malmö received 308,000 tons, corresponding to 54 per cent. of its total imports.

Trade in Chemicals

A large city purchases, as a rule, besides coal, considerable quantities of grain and grain products, as well as building materials of different kinds. This applies to the three chief Swedish ports. Expressed in weights the various groups of articles coming after coal are as follows :—

Stockholm : Metals and metal manufactures, grain and grain products, oils, building materials, salt and chemicals.

Gothenburg : Grain and grain products, metals and metal manufactures, chemicals, oils, raw textile materials.

Malmö : Grain and grain products, fertilisers, metal and metal manufactures, feeding stuffs, and oils.

There are, in Sweden, quite a number of institutions guarding and promoting the interests of the exporter, but at the moment of writing I can only remember two bodies of any importance concerned with import trade—one is concerned with coal.

Sweden is a fairly large country, as countries go in Europe nowadays. It has an area of 178,000 square miles, but the population is only 6,000,000, making a density of not more than 34 to the square mile. During the last thirty years or so Sweden has passed through an evolution towards comparatively high industrialisation. It was formerly an agricultural country, but at the present day more than half of the population are engaged in industry. The standard of living compares favourably, to say the least, with the general level of other industrial countries. Automobiles are everywhere in use.

Points for the Exporter

A glance at the map will show that the Scandinavian countries and Finland, though in close proximity, do not form a geographical unit. This should not be overlooked by the foreign exporter who contemplates new appointments or arrangements. It is only natural that in this matter there should be a certain national sentiment, as each country likes to be regarded as a separate sales unit. This particular point has been touched on repeatedly both by official representatives and by private individuals in all the four countries concerned.

Turning to the question of appointing representatives in different parts of Sweden, it is hardly necessary to say that Stockholm forms, like most capitals, the financial centre of the country. Geographically Stockholm also occupies a central position, and its situation is particularly favourable from the point of view of Baltic transit trade. It may, therefore, be said that the exporter abroad should look to Stockholm in the first place when desiring to appoint agents or place representatives. He should, however, bear in mind that a good many of the large Swedish importing houses have offices both in Stockholm and in Gothenburg. The latter town is, besides, the headquarters of a number of prominent individual import firms.

As to the question of appointing sub-agents, it is well to remember that Sweden is a country of considerable length. Geographical conditions make it necessary to give special care to the question of sub-agencies. If, therefore, Stockholm is taken as the given business centre, the following cities should in the first instance be selected as stations for sub-agencies.

First on the west coast comes Gothenburg, not only the chief seaport of Sweden and a flourishing industrial town, but also the gateway to what is probably the most important hinterland in Sweden. Then there is Malmö, and finally the northern city of Sundsvall. The facilities for commerce and shipping of the free port are well known. Free ports have been established for a number of years at Stockholm, Gothenburg, and Malmö. The depth along the wharves varies between 25 and 30 feet.

British Imports

Turning to the various groups of British goods exported to Sweden, it is not necessary to dwell at any length on coal, which is by far the most important item. In Sweden coal is no great factor in metallurgical smelting, it being principally used for power production. On account of the high quality of Swedish ore and the high cost of the charcoal used for smelting, it would be unprofitable to use Swedish-made mild steel for a great number of requirements. Accordingly, while Sweden sends in normal years some 100,000 tons of pig iron and about 100,000 tons of other iron and steel to this country, she buys about 120,000 tons of various products from British rolling-mills and blastfurnaces.

The following figures represent values of principal commodities exported from Great Britain to Sweden in 1923 :

Iron and steel and manufactures thereof, £642,393 ; machinery (not specified), £301,865 ; tin, unwrought, £140,245 ; rubber, £127,000 ; sugar : molasses, £106,172.

Advertising Facilities

The periodical press and the trade papers in Sweden have, of course, not reached the same importance, either in bulk or in circulation, as corresponding publications in Great Britain. The daily papers in Sweden and their Sunday issues have been, and still are, meeting demands which in other countries are filled by periodical reviews and magazines. This the foreign exporter should make a note of, since it follows that the daily papers hold a dominating position from the advertiser's point of view. During the past few years some of the daily papers in Sweden have published special British numbers or brought out British sections. Naturally an appeal has been made to prominent British firms engaged in trade with Sweden, but the result has been disappointing.

When information about trading conditions in Sweden is desired, it may be obtained from the permanent organisations established for that purpose—Consular representatives and Chambers of Commerce. In Sweden there are 25 British Consuls, and, besides the Consul General in Gothenburg, there is a commercial secretary attached to the Legation in Stockholm.

The official intelligence service in Great Britain is centralised in the Department of Overseas Trade, and I might venture to express the opinion that the resources of this institution are at present not sufficiently used by foreign representatives in this country. There is, I believe, also room for increased co-operation between the various foreign Chambers of Commerce in Great Britain and their British sister institutions. The Swedish Chamber of Commerce in London forms one of the points of inquiry from which information about British goods is supplied to Swedish buyers.

During the first ten years of this century there was a general feeling in Sweden that the possibilities of the country both as a purchaser and as a supplier were not sufficiently explored or utilised in Great Britain. It is, however, undeniable that a considerable change in this respect has taken place, and it is to be hoped that this change will be of lasting growth, to the mutual benefit of the two countries.

A Vindication of Private Enterprise in Business

By Sir Ernest Benn

We reproduce below some typical extracts from "The Confessions of a Capitalist," a new book by Sir Ernest Benn, published yesterday. (Hutchinson & Co., 18s.)

"I SHOULD have thought it was the aim of all political parties to effect by means of social legislation a more equitable distribution of wealth." That reply was given as recently as February, 1924, by the Lord Privy Seal, Mr. J. R. Clynes, with the object of placating his hearers and demonstrating the sweet reasonableness of the Labour Government and its sympathy with the parties to which it was opposed. That reply was received by the House with general agreement and shows how completely we have accepted the notion that it is the duty of our legislators to effect this "more equitable distribution of wealth." It throws an interesting sidelight on the state of the public mind. I venture the opinion that there were not more than a score of persons present in the House of Commons who felt that this statement of Mr. Clynes was a tragedy instead of a pious expression of the opinion of all parties. To me the attempt to redistribute wealth by legislation is a farce and a sham, for while it appears on the surface of things to be effective, it does not in reality have any such result. It is easy to destroy wealth by legislation, and the human race is poorer, and human needs are still unsatisfied, largely by reason of the great quantities of wealth that have been eliminated in this way. But to make wealth or to redistribute wealth by any process but the action of the individual is, so it seems to me, both ineffective and uneconomic. Thus, when I hear of political parties agreeing that they will build houses for the working class, I only see the supply of houses becoming ever shorter and shorter. I know what the politicians have done in other matters such as the Irish question, and I am not anxious to see houses, employment and other such vital things made the sport of political discussion for generation after generation, eventually to go the way of all political questions.

Unlike the ordinary anti-Socialist agitator I blame quite definitely the business community for the state of mind into which the public has been allowed to drift. Business men have clung to the old tradition that politics and business are things apart, and have allowed political forces to work in almost complete ignorance of the facts concerning the very matters with which they have been dealing. That was all very well so long as politics were concerned with the Franchise, Education, Home Rule, or the Disestablishment of the Church. To-day, however, when politics are almost entirely concerned with business matters, that attitude must be abandoned.

Theory and Fact

Science depends on fact as well as theory. The science of medicine would be a poor thing if it relied solely upon the theoretical. But the science of economics has been left almost entirely to the theorists. Except for Ricardo, I do not recall a single case of a man with much experience in the payment of wages who has ventured to write upon the theory of wages. I do not know of any other case where a man who has made a large profit has contributed to discussions upon the theory of profit. I propose, therefore, to offer myself as a sacrifice, as it were, upon the altar of economic truth, to take my doings and examine them in the light of theory—a process which, it is my hope, may be found to be useful in these days when the economic structure of society should be the concern and study of all.

I am further encouraged to embark upon this self-imposed task by the folly of many of the efforts that are made to defeat Socialism. Socialism will not be killed by the exploitation of the "Red Bogey," by the appeal to the selfish instincts of those who happen to possess a little more than the average of this world's goods. That would seem to be obvious if only for the reason that these persons are in such an insignificant minority. But if it is a fact, as I believe it to be, that my income is merely the index of the much bigger income enjoyed by a very large number of my fellow men, who, all of them, would lose such amenities as they now possess if my income were to go, then I have a case which must surely be examined, understood and, if proved, accepted.

Choosing a Career

The biggest problem that any family has to face is that of placing a young man in surroundings which will enable him to develop along his own lines and succeed in his own particular calling. This in most cases, although nine out of ten do not know it, is the rendering of satisfaction in some form or other to their fellow creatures, or, in other words, finding self-expression through service.

I certainly began in a blind alley with no definite duties except to do what I was told, with no training and with few prospects except such as I could find for myself. There is a deal of nonsense talked about "blind-alley occupations," and a quantity of money wasted in training-schemes which are inspired by this supposed evil.

I am strengthened in these very unorthodox views by the fact that to-day I am supported by quite a number of colleagues of whom exactly the same may be said. A valued member of my Board of Directors responded to a notice that I put into our office window in 1897 announcing the fact that a boy was wanted. He was working the copy-press in a solicitor's office for a few shillings a week and did not find the satisfaction which his mind and soul were seeking in that process. It seemed to him that a boy's work in a publishing office might afford more scope, and his idea proved right. A second colleague, who now occupies a very important position in the advertising world, was trained for the motor business, and a third was earning a poor living as an artist in decorated leather when he was attracted by the opportunities that publishing seemed to offer. Definite training in some subjects is, of course, essential to the man who would follow one of the recognised professions. I am talking only of the preparation for what is to me the most delightful and most important of all the professions—the preparation for a business career.

After three years as office boy, at the age of nineteen, I was allowed to go off on the road as a traveller, selling advertisement space in my father's newspaper, *The Cabinet Maker*. In that capacity I worked hard and happily for the next six years. As a traveller I achieved some success and can claim to have a fairly intimate acquaintance with the business habits of most of the leading firms of the country in the years from 1895 to 1900.

If anything could ever induce me to consent to any form of legislative rule and regulation in commercial matters, I would decree that no one should be permitted to express an opinion upon the conduct of industry, upon employers and employed, upon capital, labour or any of the questions affecting our industrial life, until he had completed a period of at least twelve months as a traveller on the road.

The commercial traveller is singularly well-placed for observing both sides of the question, and is thus able to understand and appreciate that sense of balance which is the essence of the industrial problem. He knows, from his own experience and not from mere hearsay, that there are producers and consumers, for it is his business day-by-day to listen to, to weigh up, and to balance the contending claims of both these parties. He must represent to his customers the point of view of those who make the article he is endeavouring to sell, and he must spend his evenings in representing to his employers, with speed and accuracy and insight, the opinions, often none too complimentary, of the customers who are to use the goods and services he offers. Left under no misapprehension regarding the essential nature of industry, he realises the folly and irrelevance of most public discussions on these matters.

Early Savings

The man who thinks that a fortune will result from the saving of coppers and shillings is hugging a delusion, and it would be absurd to pretend that my position can be attributed entirely to the saving habit. It is, however, perfectly true that too much emphasis cannot be laid on the fact that saving is the basis upon which the whole structure rests. I

have been a saver all my life, and it is perhaps because the habit was acquired in my earliest years that it has been consistently maintained.

I suppose it is unnecessary to argue with the reader that saving is the first essential to human life. Unless there is saving, life comes to an end. We have only to eat all the potatoes of this year's crop to make quite sure that no potatoes will exist next year. If we consume every egg that is laid, a couple of seasons would be sufficient to eliminate eggs and poultry from the list of things we enjoy. The argument can be carried right through every branch of human activity.

We all depend absolutely for our continued existence upon the fact that some commodities available for consumption are not, in fact, consumed, but are held over, or "saved," for future use. This is the bedrock of the capitalist system. It does not even matter who does the saving; the all-important thing is that the saving should be made. Saving is out of fashion. Having regard to our increased wealth we save less and less, and such elementary dicta as: "Penny wise and pound foolish," and "Look after the pence, and the pounds will take care of themselves," are seldom heard to-day. Still we all recognise that something in the way of saving is desirable.

One of the most extraordinary of the many peculiarities of these peculiar days is that, as good fathers of families, acting upon our own responsibility in our homes, we are all anxious to some extent to save a little for the benefit of our children. Nevertheless, the moment we put on our best clothes and meet together in the parish council, or in any other form of public assembly, we all vote vigorously for the piling up of debt which these children must eventually pay: and I am sadly afraid that future generations, who will see this problem from a different angle, will curse us for that part of the debt bequeathed to them which is not represented by good investments. I cannot, indeed, deny to future generations their denunciations of the War Debt, which for a century they will, of course, be paying. We ourselves are still paying debts incurred in the Napoleonic Wars; but then we are still afflicted with notions as to the necessity and inevitability of war. When, as is surely coming about, our great-grandchildren grow up in a world which has discarded this form of barbarism, which they will fail to understand, and yet find that they have to pay for our indulgence, can it be doubted that they will denounce their grandfathers for the terrible consequences of the last twelve years?

Wealth is Exchange

It does not matter one little bit what may be the system under which we work, what it is called, or how it is devised; nothing can ever alter the fact that if we wish to be civilised we can only live by the will of others, who are willing to give us those things which we require in exchange for something which we have to offer. This rule is of universal application.

The business man is the agent of exchange, and, because it is, as a rule, far more difficult to exchange an article than to make it, the business man generally secures a higher remuneration for his part in wealth production than the labourer who performs the simpler and easier work of wielding the hammer or the saw.

One justification for this lies in the fact that exchange involves risk, and the recognition of this element of risk is of primary importance. Let me give an illustration. A man sets to work to make buttons. His object is to earn a living, which is another way of saying that he intends to serve his fellow-creatures by exchanging with them buttons for other commodities. We have already noticed that it would take each one of us several weeks to carve out the pieces of bone forming the buttons upon our clothes. Our button maker therefore puts down a machine which is calculated to make a million buttons per annum for the next ten years, and he thus begins a process of exchange which will not be completed until the ten millionth button is made and stitched on to somebody's shirt ten years hence. But who can say that in ten years' time anybody will be willing to accept and use this particular type of button and put upon it the value which it is calculated to possess at the time when the maker first instals his machinery?

That simple illustration brings out the element of risk in the exchange which takes place between all the individuals concerned in the making of the machine, and the man or woman who ten years later gives of his or her goods of services to secure one of those buttons.

Business and Prosperity

In the first six months of 1924 *The Hardware Trade Journal* instituted a competition in which it invited retail ironmongers to keep a record of their purchases from advertisers and others, and, as the prizes amounted to £1,000 in cash, a good many records were kept, and the figures produced were representative and reliable. Out of this competition there arose a discussion as to the value of the retail hardware trade of the country, and the argument narrowed itself down to a point where it was agreed on all sides that the retail ironmongers of the land were doing a business of not less than £80,000,000 per annum—probably a good deal more. From this it may be argued that in claiming £3,600,000 worth of trade as a result of the efforts of the hardware press, I am, in all probability, seriously underestimating its value.

These figures have some interest in connection with current political discussion. That the little ironmongers' shops all over the country, never mentioned in political controversy, forgotten by the Communists, left out of account by those who are so busy putting the world right, should be doing a trade of £80,000,000 a year helps to explain the deep-seated scorn and contempt with which the business classes regard futile arguments over such things as Russian trade agreements and the paltry few millions that are held up as vital to the general well-being.

It is not difficult to imagine what figures such as I have quoted mean when translated into terms of wages and employment. I have the satisfaction of knowing that out of the bank account of *The Hardware Trade Journal* alone, some £40,000 a year is paid in wages to the people who are directly engaged in its production, and another sum, almost equal in amount, goes to swell the wages fund through more indirect channels. The paper carries half a dozen salaries, each of them far bigger than the whole of the profits of a few years ago, and is able to pay wages to compositors and manual workers at rates three times as high as those of 1900.

Those early struggles associated with the establishment of *The Hardware Trade Journal* are in every way typical of all business growing-pains. There are many thousands of young men who ought to be encouraged by every means in our power to undertake the same kind of struggle. There were in 1900, and there are to-day, enough real difficulties with customers and creditors and business technicalities to make the task sufficiently formidable and to make the number who will essay it dangerously small. Therefore, it seems to me to be the height of folly that we, as a community, should make work of this kind doubly difficult by creating restrictions and barriers in every direction, either by labour regulations or by legislative enactments. It cannot be denied that the problem which I tackled in 1900 was easy compared with similar problems to-day. If I had had to waste all the time in 1900 that I now waste in filling up forms, I am quite convinced that I should have given up. There were periods, constantly recurring, when one was forced seriously to consider one's position, and when every bit of courage that one possessed had to be screwed up to the highest pitch. Often very little was needed to bring the whole effort to an end.

It is too little realised that the business of the country depends upon a constant supply of new men and new enterprises to make good the deterioration and wastage of the old, and to add that new mass of service which must be available year after year if the standard of living is to rise. That supply of new men is being dammed up at the source by the modern theory that the State or the community can take the place of individual effort.

We have a bad way, we English, of attributing our troubles to causes beyond our control. We are invited to believe that our unemployment, our bad trade, our low standard of living, are the direct outcome of the state of affairs in Russia and in other remote parts of the world. My suggestion is that a further understanding of these matters may lead us to appreciate that the main cause of the majority of our troubles is the modern mania for invoking public action, for taking money which would be productive and useful, if left in private hands, and rendering it sterile and useless in the dead hand of the State machine.

The Twilight Zone of Matter.—(II.)

By Dr. Alexander Findlay

In our issue of September 12 we published the first part of the address on this subject which Dr. Findlay of Aberdeen delivered recently to the American Chemical Society. His concluding remarks are reproduced below.

Colloidal State in Biology

LET me now refer briefly to the part which colloid matter plays in biology and in various life processes. The protoplasm of the cells, as has been demonstrated by the work of Goidukov and by Price, consists of a mixture of colloids. In the cell, indeed, we have, as it were, a complex emulsion or mixture of colloids which, under the changing conditions of life, may vary in consistency from that of a colloidal solution to that of a colloidal gel or jelly. In this system there occur processes of adsorption, changes in dispersity, alterations of the distribution of water between the colloidal particles and the dispersion medium. The living protoplasm, indeed, is a complex system of colloids between which the mutual relations are in a constant state of flux under the action of electrolytes, and of stimuli of different kinds; and in which the mass law relationships are altered, now in this direction, now in that, thereby enabling the processes of decomposition and of synthesis to take place. Only in such a colloid system is it possible to have the flexibility and adaptability to the varying requirements of what we call life and growth. Just as we have seen that gelatin, fibrin, and other colloids can imbibe and hold large quantities of water, so it is possible for the living organism, aided no doubt by osmotic forces, and the presence of membranes of a semi-permeable character, to hold the 20 per cent. of water present in the body tissues, and to preserve the vigour necessary for healthy life. Moreover, the many diverse chemical reactions involved in the breaking down of complex foodstuffs into simple substances, and the building up again of these simple compounds into the complex proteins of the protoplasm, are accomplished in the living body under the catalytic activity of the enzymes, and these are themselves colloids.

The living organism, therefore, is a vast colloidal community, the diverse members of which are held together in common service by surface forces, and by the mutual actions and reactions of electrical changes, and in this community the colloidal workers are engaged in carrying out the multifarious and complex chemical operations on which the life and the health of the community depend.

Influence of Electrolytes

Neither my knowledge nor the time at my disposal will permit me to discuss at length the work more especially of Martin Fischer in emphasising, it may be in over-emphasising, the analogy between the inhibition of water by gelatin and the water absorbing and retaining power of the colloids of the living organism as affected by variations in the concentration of electrolytes, and especially of acids. That work is of great interest and importance, but I wish here to refer rather to the work more especially of Bancroft and of Clowes on emulsions as affording a suggestive explanation of the action of the plasmatic membrane of cells.

One of the most interesting phenomena in connection with the action of electrolytes on living cells is the so-called antagonistic action of ions. The beat of a heart, for example, continuously perfused with a solution of sodium chloride, isotonic with the blood, soon ceases, but the " toxic " action of the sodium ions can be counteracted by the addition of a small amount of a calcium salt. Similarly, as Loeb showed, the marine organism *Fundulus* dies when placed in a solution of sodium chloride of the same osmotic pressure as sea water, and it dies also in a solution of calcium chloride. In a mixed solution of these two salts, however, containing the salts in the ratio of about 50 molecules of sodium chloride to one molecule of calcium chloride, the organism continues to live. Since, as Straub has shown, the effect of electrolytes is an effect on the cell membrane, it is to the latter effect that we may turn our attention.

As the general behaviour of cells shows, the protoplasm of the living cell is surrounded by a membrane or surface layer which acts as a membrane of such a kind that it allows the passage of certain dissolved substances but prevents the passage of others. While in some respects this plasmatic membrane is similar to the artificial semi-permeable membrane like copper ferrocyanide, experiment shows that very important differences exist. The membrane of the living cell, as Magali has shown, is self-forming, and it differs also from the inorganic semi-permeable membranes in the fact that its permeability may vary and that it is adaptable to the varying requirements of an ever-changing life process. While the cell is resting, for example, the plasmatic membrane is impermeable to glucose and the animo-acids, but when the cell passes into a state of functional activity these substances can pass through the membrane.

The permeability of the plasmatic membrane is also variously affected by different ions. When frog's muscle, for example, is placed in an isotonic solution of potassium chloride it is found to be permeable to potassium ions. When, however, sodium and calcium salts, which are normally present in blood plasma, are added, the normal impermeability of the muscle cells to potassium is regained. While the resting muscle cell is impermeable to potassium salts, the active muscle cell is permeable.

Permeability of the Cell Membrane

In considering the nature of what has been called the plasmatic or cell membrane, it has to be borne in mind that we are dealing here with a surface film or layer comparable with the layer of increased concentration which forms at the boundary surface of a solution when the surface tension of the solvent is lowered by the solute (*e.g.*, solutions of peptone). The materials forming the plasmatic membrane must be drawn, therefore, from the constituents of the cell, more especially lipoids. Various views have been put forward to explain the selective permeability of the cell membrane, in view of the variability of the cell membrane under different conditions, and in view more especially of the antagonistic action of ions on the permeability, much interest attaches to the work and suggestions of Bancroft and of Clowes.

When water and olive oil, for example, are shaken vigorously together, the oil is broken up into drops. These are, however, comparatively large, and no permanent emulsion is formed. In order that the droplets of oil may become sufficiently finely divided and a permanent colloidal emulsion obtained, an emulsifying agent must be added which assists in the breaking up of the drops and prevents them from coalescing.

It has been shown by Bancroft that a solution in water of a sodium soap has a lower surface tension than when the soap is dissolved in oil, and that when a mixture of oil and aqueous soap solution is shaken, an emulsion of oil in water is formed. On the other hand, the surface tension of a solution of a calcium soap in water is greater than in oil, and in this case, therefore, an emulsion of water in oil is formed. In the former case the water is the continuous phase, while in the latter the oil is the continuous phase.

The reversal of an oil-in-water emulsion to a water-in-oil emulsion can be effected by different salts. Alkali salts, for example, favour the formation of oil-in-water emulsions, while calcium salts favour the formation of water-in-oil emulsions. Here, again, we have the same antagonistic actions of ions as in the case of heart muscle. Similarly, blood plasma may be regarded as an emulsion of fibrinogen and other colloids in an aqueous medium, while the blood clot may be regarded as an emulsion of water in fibrin. The production of the latter system is favoured by calcium salts but is retarded by sodium salts.

Clowes has shown that there is a very close resemblance between the effects produced in emulsions of oil and water and those produced in biological systems, and he has made the valuable suggestion that the cell membrane is a system, a colloidal emulsion, of two phases—a watery solution of protein and a lipoid phase. In the resting state of the cell the membrane consists of an emulsion of protein solution in lipoid, the latter being the continuous phase. In this state, therefore, the membrane will be permeable only to the substances which are lipoid-soluble. In the active state of the

cell there is a reversal of the emulsion, and the aqueous phase becomes the continuous one. In this case, substances soluble in water will now be able to pass through. In each case, however, regarding the emulsion-membrane as a sieve, the membrane will be permeable only to those substances the particles of which or molecules of which are small enough to pass through the "pores" between the droplets of the dispersed phase.

According to this view, we shall regard not only the protoplasmic cell contents but also the surface layer or cell membrane as a colloid system, and by adopting the view, probably not complete in itself, that the cell membrane is a complex emulsion of colloids, the two phases of which are capable of undergoing reversal, one is able to explain many at least of the phenomena associated with the action of the cell membrane.

Indian Chemical Notes

(From Our Indian Correspondent)

The Bombay University Reform Committee has recommended the establishment of a technological college in Bombay, of which applied chemistry will form a branch. It is suggested that this branch should be attached to the Royal Institute of Science, Bombay, and should be equipped with special laboratories, not on a full industrial but on a comparatively smaller scale, containing types of the principal kinds of plant used in chemical manufacture. The department might undertake branches such as chemical engineering, general chemical technology, the chemistry of textiles, colouring matters, and possibly such others as fuels, foodstuffs, electro-chemistry, indigenous drugs, and photography.

The investigation work in fixed and essential oils carried out at the Institute of Science, Bangalore, in the past year, has shown that the oil from the marking nut *Semecarpus anacardium*, which, besides therapeutic application, is used in dyeing and cleaning, contains a considerable proportion of unidentified phenol anacardol, while the fixed oil from the kernels resembles cashew-kernel oil. The gum shed in the wood of *Gardenia turgida* has been found to yield a material freely soluble in water and containing a large proportion of mannitol. The use of mixed catalysts in the hydrogenation of oils has also been studied in the hope of effecting improvements in a manufacturing process which is now practised on a very large scale.

Bengal Export Trade

The report on the seaborne trade of Bengal for the year 1924–25 shows that exports of lac declined from 485,000 cwt. in 1923–24, to 428,000 cwt. in the year under review. It must be remembered that exports of lac from India have all along been increasing, and this setback during the year is attributed to American industrial development. The export of the finished product has declined, while exports of raw material (seed and stick lac) have been doubled. At the same time shipments of refuse lac have fallen, the demand for this by-product having now been more fully satisfied from the American shellac factories. Most of the seed and stick lac went to the United States, but shipments to the United Kingdom also showed a remarkable increase. The manufacture of bleached shellac has been begun in the United States, and a British patent has been granted to the Society of Chemical Industry of Basle for the production of artificial shellac. The lac industry in India appears to be in danger, a fact which has been recognised by the opening of a Government Research Institute at Ranchi.

The exports of mica from Calcutta, during the same year, almost remained the same as in the previous year—i.e., 72,000 cwt. The value, however, increased from Rs.78 lakhs to Rs.88 lakhs. There was a decline from 12,000 to 10,000 cwts. in shipments of block mica and a small increase from 60,000 to 62,000 cwt. in exports of splittings. The Mica-Mining Association have been much exercised of late over the problem of illicit mica trading. It has been estimated that as much as half the mica extracted finds its way into the hands of parties not entitled to its possession.

S. G. W.

Hydrated Lime in the Tannery

A Survey of Its Uses

Every tanner knows the important effect of the liming operation upon finished leather, and so conducts the process with a good deal of care, but it is unusual to find anything like so much care exercised in the actual choice of lime. The latter affects the quality of the leather to a marked extent, and it is not thoroughly realised that hydrated lime has very many advantages over quicklime for liming. Firstly, it can be bought in bags in the form of a very fine powder, which mixes with water very easily to give a suspension that does not settle out nearly so rapidly as lime slaked by hand in the ordinary way. The slaking operation is avoided altogether. This is a most important factor, as improper slaking is not only wasteful, but may also be responsible for burns and other faults in the hides.

Just as the temperature of burning of limestone has a marked effect upon the physical properties of the resultant lime, so variations in the temperature and rate of addition of the water used in the slaking of quicklime alter the product considerably. If cold water is added rapidly to the lime, the latter slakes only very slowly, and large quantities of soft, inactive grit are formed. This grit is quite insoluble in water, and will not give the usual reactions for lime, and is, therefore, of no use in the depilation process. Moreover, all the hydrated lime formed when cold water is used is in a somewhat coarse state of division. When cold water is added at the correct rate to the lime the temperature rises owing to the heat liberated during hydration, and good slaking is obtained. When hot water is used less care is required to avoid the formation of inactive grit, but if too little water—hot or cold—is added, the centre of each individual lump becomes "steam-slaked," and a very lumpy, inactive product is obtained.

The tanner invariably uses far more lime than is actually necessary for dehairing, partly because during storage quite an appreciable quantity of the lime is converted into calcium carbonate by the action of the carbon dioxide of the atmosphere, and so is useless for the purpose in hand, and partly because very often lime, as bought, contains a certain amount of unburnt stone in the centre of the larger lumps. It is also quite usual to find some of the smaller lumps hard-burnt, in which case slaking is almost impossible.

Comparative Analysis

Whilst hydrated lime, therefore, contains about 94 per cent. of calcium hydroxide, corresponding to 71 per cent. of CaO, and the best hand-picked quicklime as it leaves the works has a CaO content of about 96 per cent., it has been found that, weight for weight, a smaller quantity of hydrated lime than of quicklime is usually necessary for any particular piece of work.

Taking into consideration the facts that the slaking process is avoided, that there is no danger of burning, and in view of the greater efficiency of hydrated lime as compared with hand-slaked lime, there is little doubt that in the long run it is cheaper to use lime hydrated by the makers under special conditions.

A sample of hydrated lime made by the Buxton Lime Firms Co., Ltd., was examined recently and was found to be of a high degree of purity and in an exceedingly fine state of division, as shown by the following analysis and sieve test. The extremely low iron content does away with the possibility of the appearance of iron stains on hides dehaired by this hydrated lime, which incidentally also contains practically no magnesia, a substance which tends to make the leather harsh and is also ineffective as a depilatory.

Analysis.

Calcium oxide CaO	73·5	
Silica SiO_2	0·6	
Iron and alumina Fe_2O_3 and Al_2O_3	0·24	
Loss on ignition H_2O, CO_2	25·35	
Magnesia and sulphate	0·31	By difference
	100·00	

Practically 100 per cent. passes through a 200-mesh sieve.

It is a practice in many tanneries to use a paste of lime and sodium sulphide for the depilation of sheep skins. For making such pastes, hydrated lime is remarkably suitable, since not only is it in a very fine state of division but is also perfectly dry, so that the relative proportions of the two ingredients can easily be standardised.

From Week to Week

MR. F. L. MORRIS, of Sydney, is at present in London, and wishes to hear from British manufacturers of heavy chemicals. Letters, care of Bank of New South Wales, 28, Threadneedle Street, London, E.C.

THE CONTENTS OF "THE HILL," Hampstead, the residence of the late Lord Leverhulme, are to be sold in New York. The famous art works are included, but the executors have the right to reserve any works which it is proposed to purchase for the nation.

KRUPPS, the great Essen concern, are stated to have withdrawn from the proposed Rhenish-Westphalian iron and steel trust on the grounds that the disappearance of such a well-known name would be economically disadvantageous. They are willing to co-operate on the production side.

A NEW SCALE OF FEES has been approved at Manchester University. The varying amount of the increase in science fees is shown in the following examples of sessional rates for some of the honours courses :—Engineering, 41 to 45 guineas ; physics, geology, or general science, 36 to 40 guineas ; chemistry, 41 to 42 guineas.

GRANGEMOUTH, which is now recognised as the largest oil-distributing centre in Scotland, will be further extended in the immediate future. Arrangements have been completed for further storage at the docks by the erection of tanks to accommodate spirits and burning oils which arrive for distribution. The latest venture is by the Russian Oil and Product Co., Ltd.

THE DIRECTORS OF NOBEL INDUSTRIES, LTD., have conferred upon Mr. H. J. Mitchell the title of "general manager," and appointed as secretary Mr. W. H. Coates, B.Sc., who will shortly relinquish his duties as Director of Intelligence and Statistics in the Inland Revenue Department. Sir Josiah Stamp, who has left the company to join the executive of the London, Midland and Scottish Railway, will continue to act as a director of Nobel Industries, Ltd.

ALCOHOL FROM BREAD is reported to be possible by the invention of an Italian engineer, Mario Andrusiani. Trials have been made at a bakery in Lichtenberg and the apparatus traps and condenses the alcohol contained in the fumes given out by bread whilst in the oven. At Lichtenberg one litre containing 65 to 85 per cent. of alcohol is said to be obtained from every 100 kilograms of flour baked. After one test Customs authorities seized the apparatus and stipulated that the inventor should obtain a licence.

THE FRANKLIN MEDAL has been awarded to Professor Pieter Zeeman, of Amsterdam, Holland, in recognition of his numerous and important contributions in the field of magneto-optics and particularly of his discovery of the effect of a magnetic field upon the frequencies of the light from a radiating source, and to Dr. Elihu Thomson, of Lynn, Mass., in recognition of his pioneer work in the field of electricity and electrical engineering, and of his numerous inventions in these fields.

A CONFERENCE OF THE SMOKE ABATEMENT LEAGUE of Great Britain will be held at Buxton from Friday, October 2, to Monday, October 5. It is expected that the chief subject of discussion will be a proposal to establish in each large municipality a "smoke abatement" department in the charge of a qualified engineer, whose duty it would be to advise all who seek help in the choice of a means of lighting or heating. All interested are invited to attend the conference which will be held at Palace Hotel.

SABOTAGE IS ALLEGED in connection with the damage discovered on Thursday, September 17, at Calderside Dyeworks, Hebden Bridge, owned by the Walker Dyeing Co. The first worker to arrive found that driving belts had been cut, the engine incapacitated, and vitriol and other chemicals thrown over the stock. The damage is estimated at £500, and is covered by insurance. There has been a trade dispute at the works recently and for several weeks the firm had been running with a non-Union staff. On Monday it was found that the outrage had been repeated.

SINCE THE FOUNDATION of the *Journal of Scientific Instruments* two years ago, the editorial work has been carried out on behalf of the Institute of Physics at the National Physical Laboratory by Dr. John S. Anderson. The Institute of Physics finds that it is unable to continue the contribution of the amount payable to the National Physical Laboratory for Dr. Anderson's services, and the arrangements so far existing have accordingly been terminated. Dr. C. V. Drysdale, who has been a member of the Editorial Committee for some time, has been appointed editor. All editorial communications should in future be addressed to Dr. C. V. Drysdale, 11, Barkston Gardens, London, S.W.5.

THE OPENING MEETING of the Chemical Engineering Group for the session 1925–6 will take place on Friday, October 9, 1925, in the Hall of the Royal Society of Arts, 18, John Street, London, W.C.1. Dr. W. E. Gibbs of Runcorn will present a paper entitled "Aerosols in Industry," the paper will be illustrated by lantern slides, and in view of the importance of the questions raised, an interesting and useful discussion is confidently anticipated. The chairman of the group, Mr. C. S. Garland, will preside and will take the chair at 8 o'clock. Arrangements are being made for a number of other meetings to take place during the session, both in the provinces and in London. Definite dates, however, have yet to be fixed.

THE DEGREE OF M.Sc. has been conferred by Durham University on the following :—Robert Gregory Absalom, Robert Batie, Joseph Brown, and Robert Arnold Green, all of Armstrong College.

A SCHOOL OF CHEMICAL WARFARE RESEARCH OFFICERS was held at Fort Logan, Colorado, recently. Instruction included lectures on the manufacture and properties of the various toxic acids, and practical field work was done.

MR. GEORGE WESTGARTH, M.Sc., has been awarded the degree of Doctor of Philosophy by the University of Durham, for research work at Armstrong College. Mr. Westgarth was a Senior Pemberton Scholar in 1920.

MR. L. M. ZIMMER has been appointed general sales manager of the Linde Air Products Company, manufacturers of oxygen, and of the welding gas division of the Prest-O-Lite Company, Inc., manufacturers of dissolved acetylene, succeeding Mr. L. M. Moyer, who resigned last month.

PEACOCK AND SON, of Castleford, have decided to reopen their glassworks on a co-partnership basis forming a company with a capital of £5,000. Each man will have a share of £50 to be purchased by instalments if desired, and a start will be made with a staff of fifty men and a commercial department.

COLONEL THE HON. F. VERNON WILLEY, president of the Federation of British Industries, has left on the *Aquitania* for New York. He is to obtain information as to the state of industry in America, and a visit to Canada will be included in a month's stay. Mr. Guy Locock, Overseas Director of the Federation, accompanies him.

MR. ERIC D. PETERS, 24, of Woodkirk, near Leeds, a director of the Methley Chemical Co., Ltd., came before the Leeds City Justices on Thursday, September 17, on a charge of the fraudulent conversion of £235. Dadswell, another director of the company similarly charged, had been admitted to bail on the previous day, and Peters was remanded to September 24, bail being allowed.

JAPAN'S SECOND NATIONAL CHEMICAL INDUSTRIAL EXHIBITION will be held at Tokio in March, 1926. It will last for two months, and will be run under the auspices of the Japan Chemical Industrial Association, supported by the Government. Its aim is to encourage the national industries, and foreign-made products will be shown side by side with all home products for purposes of comparison.

PROFESSOR DOUGLAS MCCANDLISH, head of the Leather Industries Department of the University of Leeds, was on Monday unanimously elected President for the next two years of the International Society of Leather Trades Chemists, now sitting in Paris. Professor McCandlish was chemist to William Paul, Ltd., of the Oak Tannery, Leeds, and subsequently was with A. F. Galleen and Sons, Milwaukee, U.S.A., which post he left in 1919 to take up the Leeds professorship. He has written much on the scientific side of leather manufacture.

AT THE ANNUAL CONFERENCE of the Association of Special Libraries and Information Bureaux, to be held in Balliol College, Oxford, during the coming week-end, papers will be contributed by Mr. F. E. Hamer (THE CHEMICAL AGE) on "The Press in relation to Information Bureaux and Special Libraries." Mr. T. F. Burton (the editor of the Bureau of Chemical Abstracts) on "Abstracting," Dr. R. S. Hutton (British Non-ferrous Metal Research Association), on "The Present Position of the Association," and Mr. H. E. Potts on "Patents and Special Libraries."

A BRITISH DELEGATION, comprising representatives of the Commercial Motor Users' Association, the National Coke Oven Association, and the Gas Light and Coke Co., left London on Monday for Brussels, where they will attend official trials of motor lorries driven by producer-gas. Producer-gas is made from low grade coal in producers, by complete gasification. It is a low grade gas which has an average calorific power of between 140 and 200 British thermal units, and contains about 40 per cent. of inert gas. This distinguishes it from the ordinary town gas, which has about 500 British thermal units and only contains about 12 per cent. of inert gas.

Obituary

MR. H. CROSSLEY, 75, for over 40 years travelling representative for John Nicholson and Sons, Ltd., chemical manufacturers, Hunslet, Leeds.

MR. THOMAS ARMISTEAD WARD, managing director of T. A. Ward and Co., Ltd., manufacturing chemists, of Blackburn, on Friday, September 18.

Mr. ALFRED C. BEDFORD, chairman of the board of the Standard Oil Co., New Jersey. During the war he was chairman of the Petroleum Committee of the Council of National Defence.

MR. WILLIAM G. LINDSAY, chemical director of the Celluloid Company, aged 45 years. He entered the employ of the Celluloid Company in 1907, after a two years' service with Ricketts and Banks as their chief chemist. His numerous patents, which testify to a peculiar prominence in the field of cellulose plastics, represent in large measure his work on products of acetyl cellulose, a subject of growing industrial value. Others are concerned with the prevention or suitable modification of inflammability in celluloid or similar compounds having nitrocellulose as their base.

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PHOSPHATES.—The manufacture of dicalcium phosphate. R. Deckert. *Chem. Zeit.*, September 17, 1925, pp. 789-790.

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Abstracts of Complete Specifications

238,621. Oxides of Sulphur, Production of. C. S. Robinson, Louvain, Emmanuel Avenue, Mapperley, Nottingham. Application date, May 23, 1924.

Sulphur is burned in air in a closed chamber under conditions which cause high pressures to be produced. The sulphur may be introduced in the form of vapour, or as a jet of liquid sulphur, or powdered solid sulphur, with air into the cylinder of an internal combustion engine operating on the usual cycle. In this manner power may be obtained as a result of the combustion. Under these conditions sulphur trioxide may be obtained, and the rapid cooling due to adiabatic expansion reduces the dissociation of the sulphur trioxide into sulphur dioxide and oxygen. The combustion gases are free from water, and thus have a less corrosive action than those obtained by burning sulphur and hydrocarbon such as a sulphur-containing oil.

238,676. Diazo Compounds, Manufacture and Production of. J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, July 21, 1924.

Solid diazo compounds of aromatic amines of the benzene or naphthalene series are obtained by adding a zinc compound to a solution of a diazotised aromatic amine of the benzene or naphthalene series which is free from azo groups. The solution must contain sufficient chlor ions to allow a double compound of zinc and diazonium chlorides to be formed, and the addition of an alkali metal chloride may be necessary. The solid diazo salts obtained are dried, and have a good stability which can be increased by the addition of inorganic salts such as Glauber's salt, sodium chloride, aluminium sulphate, etc. In an example 1-amini-2-nitro-4-chloro-benzene is dissolved in sulphuric acid of 66° Bé., and the solution poured into cold water and diazotised with nitrite solution at a low temperature. Zinc hydroxide and sodium chloride are then added to precipitate the diazo compound, which is filtered off, mixed with dehydrated Glauber's salts, or aluminium sulphate, and dried in vacuo. Examples are also given of the production of diazo compounds from 1-methoxy-2-amino-4-nitrobenzene, and from ortho-dianisidine, and other aromatic amines such as ortho-nitraniline, ortho-chloraniline, 1-amino-2-chlor-4-nitrobenzene, 1-amino-2-nitro-4-methylbenzene, 1-methoxy-2-amino-5-nitrobenzene can also be converted into solid colourless stable diazo compounds.

238,683. Sulphamino Azo Bodies, Preparation of—and Diazoazo Compounds Therefrom. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer und Co., Leverkusen, near Cologne, Germany. Application date, July 28, 1924.

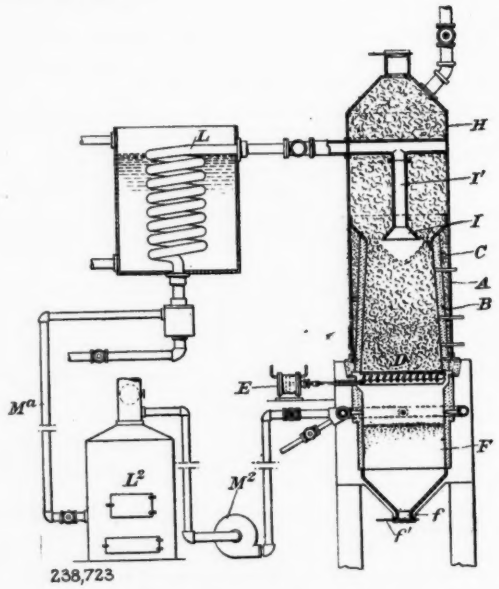
These sulphamino-azo bodies are obtained by combining diazo compounds with α-naphthyl-sulphaminic acid. The sulpho group can be split off by warming the compounds in aqueous mineral acid solution to obtain amino-azo bodies; these can be further diazotised forming diazoazo compounds, and may be coupled with any dyestuff component. The splitting off of the sulpho group and the diazotisation can be effected in a single operation. It is not always necessary to isolate the sulphamino azo bodies, as in many cases the complete coupling can be directly performed. The diazo bodies may be further coupled with a naththyl-sulphaminic acid and saponified. In this process it is found that the diazo compound enters almost quantitatively into the acid in the para position to the sulphamino group. Examples are given of the preparation of products by coupling α-naphthyl sulphaminic acid with paratoluidine, aniline, chlor-anilines, aminophenol ethers, mono-acidyl phenyline diamines, nitranilines, and their homologues, α- and β-naphthylamines, amino-naphthol ethers, aminoanthraquinones, diamino-diphenyl derivatives, etc. Other examples are given of the coupling of α-naphthyl sulphaminic acid with metasulphanilic acid and other sulphonated, carboxylated, and substituted derivatives of the benzene, naphthalene, anthracene, anthraquinone, and diphenyl series.

238,704. New Stable Diazo Compounds, Manufacture of. O. Y. Imray, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, August 26, 1924.

Specifications Nos. 202,984 and 211,223 (see The Chemical Age, Vol. IX, p. 466 and Vol. X, p. 299) describe the use of diazotised unsulphonated aryl and arylkyl ethers of ortho-aminophenols for the manufacture of dyestuffs on the fibre, but the unsulphonated aryl and arylkyl ethers of ortho-amino-phenols are diazotised with difficulty. In this invention, stable derivatives which can be isolated by evaporation or precipitation and can be obtained in solid form, are produced by treating a diazotised unsulphonated aryl or arylkyl ether of an ortho-amino-phenol with an aromatic sulphonic acid such as a mono- or poly-sulphonic acid of naphthalene. The products are yellow powders. In an example, the phenyl or benzyl ether of 4-chlor-2-amino-1-phenol is diazotised, using about twice the theoretical quantity of sodium nitrite, and the trisodium salt of naphthalene-1 : 3 : 6-trisulphonic acid then added, yielding a yellow solution which is evaporated. Other examples are also given.

238,717. Anthraquinone Dyestuff, Manufacture of. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, W. H. Perkin, Organic Chemical Laboratory, South Parks Road, Oxford, and A. W. Fyfe, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, September 17, 1924.

A process is known for converting the amino-anthraquinones into the N-methyl-omega-sulphonic acid derivatives, in which 1 molecular proportion of amino-anthraquinone is treated at 50° to 60° C., with 3 molecules of formaldehyde, 2·5 molecules of sodium bisulphite and 10 molecules of hydrochloric acid, but this does not give satisfactory results, with diaminochrysazin. In this invention, the desired product can be obtained by working with the free base of the diaminochrysazin, and treating with formaldehyde bisulphite in the absence of a strong mineral acid. The soluble dyestuff is readily formed, and a complete conversion is obtained.



238,723

238,723. Distillation of Carbonaceous Material, Method and Apparatus for. E. C. R. Marks, London. From Catlin Shale Products Co., 136, Liberty Street, Manhattan, New York. Application date, September 22, 1924.

The process is for distilling shale to obtain volatile constituents without injurious decomposition, and with the mini-

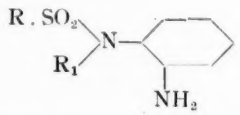
mum amount of combustion of these constituents. The heat for distillation is provided by the combustion of part of the carbon residue.

A vertical retort A has an inner wall B of firebrick, forming a slightly conical chamber, while the intermediate space C is filled with heat insulating material. A rocking grate D is provided at the bottom of the retort, actuated by a reciprocating ram E, and the solid residue is discharged into the large ash pit F, having a controlled outlet *f*. The sliding gate f^1 is operated so as to close the discharge opening before all the solids are discharged, so as to exclude admission of air. Gas and air are introduced through concentric nozzles into the space below the grate. The broken shale is contained in a hopper H, having a conical bottom and containing a conduit I^1 for the withdrawal of gases. The lower end of the conduit is conical at I, and the result of the two conical discharge surfaces is to direct the coarser material towards the centre of the retort A, and the finer material towards the circumference. The gases thus ascend more readily at the centre towards the discharge I^1. The vapour is condensed in a coil L, and the remaining gas, which is mainly nitrogen, passes back through a pipe M^a to the retort.

In carrying out the process an ash zone is maintained just above the grate, and a zone of partial combustion just above the ash zone. In the upper part of the retort, the volatile constituents are distilled off by hot gases from the combustion zone. The depth of the ash zone is determined by the rapidity of movement of the grate, and by the rate of combustion which can be regulated by controlling the supply of air and gas through the nozzles. A temperature of 750°–850° F. is maintained in the distillation zone, and the material should take about 80 minutes in passing through this zone. The gases coming from the condenser L may contain some carbon dioxide and monoxide, and in this case the gas is passed through a furnace L^2 before reaching the fan M^2 which returns it to the retort.

238,737. Azo Dyestuffs, Manufacture of. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer und Co., Leverkusen, near Cologne, Germany. Application date, October 16, 1924.

New azo dyestuffs are obtained by the combination of a diazo compound of an ortho-aminoaryl-sulphoalkyl-anilide of the general formula :



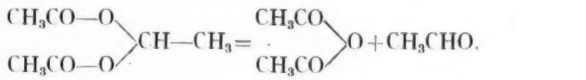
in which R is an aryl residue, and R_1 an alkyl group, with an azo dyestuff component. Diazo compounds employed include 2 - amino - phenyl - oxyethyl - paratoluene - sulphamide, and 2-aminophenyl-ethyl-paratoluene-sulphamide ; azo components include 1-(4-sulphophenyl)3-methylpyrazolone, 2-naphthol-6-or 8-sulphonic acid, 1-naphthol-4-sulphonic acid, and 1-acetylamino-8-naphthol-3 : 6-disulphonic acid. The sulphamide compounds mentioned above are obtained by treating *p*-toluene-sulphochloride with nitralinine, and treating the product with ethyl chloride or chloroethyl alcohol, and reducing in the usual manner. These dyes give yellow—orange—blue-red shades on wool.

238,805. Catalytic Metals Contaminated by Sulphur, Process for the Regeneration of. E. A. Prudhomme, 11, Rue Frederic Passy, Neuilly-sur-Seine (Seine), France. Application date, May 23, 1924.

Metal catalysts contaminated by sulphur are treated with formic or acetic acid vapour, and the metal formates or acetates thus formed are decomposed by an increase of temperature, regenerating the catalyst and recovering the vapour of formic or acetic acid. The acid vapour is passed over the catalyst at about 100° C. until sulphuretted hydrogen ceases to be evolved, and the temperature is then raised to 150° C. to recover the metal in the form of a powder. The formic or acetic acid is liberated, and is recovered in a condenser. The process is applicable to catalysts such as nickel powder which has been contaminated by sulphur from any gases which are being treated.

238,825. Acetic Anhydride and Aldehyde, Process of Manufacture of. Soc. Chimique des Usines du Rhône, 21, Rue Jean-Goujon, Paris. International Convention date, October 13, 1924.

The process is for obtaining acetic anhydride and aldehyde by the decomposition of ethylidene diacetate according to the equation :—



In the usual process, secondary reactions occur due to the too energetic condensing actions of the catalyst, whereby acetic acid and tar are produced. It has now been found that halogenated zinc derivatives or compounds such as acetyl chloride or bromide in the presence of zinc may be employed as a catalyst, in which case the yield is practically quantitative. The catalyst may be in the proportion of less than 1 per cent., and it is necessary to withdraw the anhydride and aldehyde as formed. The halogen is gradually removed by the anhydride and aldehyde vapours, and this is compensated by employing ethylidene diacetate containing a little of the halogenated derivative in solution. Most of the escaping halogen can be recovered by passing the vapours through a column containing zinc turnings. The vapour is fractionally condensed, yielding pure acetaldehyde, and acetic anhydride containing some diacetate and acetaldehyde. A detailed example of the process is given.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention : 222,094 (Farbwerke vorm. Meister, Lucius, und Brüning) relating to vat dyestuffs containing sulphur, see Vol. XI, p. 530 ; 224,252 (J. Duclaux) relating to purification and decolorisation of oils and fats, see Vol. XII, p. 59 ; 226,500 (K. Michalski) relating to manufacture of carbon monoxide and hydrogen, see Vol. XII, p. 185 ; 229,694 (E. D. Deperrois) relating to carbonising and distilling plant for wood, see Vol. XII, p. 484 ; 231,802 (L. Lilienfeld) relating to cellulose compounds, see Vol. XII, p. 591.

International Specifications not yet Accepted

237,268. Barium Sulphate. K. Ebers, 74, Manhagener Allee, Ahrensburg, Holstein, Germany. International Convention date, July 17, 1924.

Crude barium sulphate is heated with sulphuric acid and fluorspar to bleach it. The crude sulphate may contain the necessary fluorspar, and may be calcined below sintering temperature with nitre. The hydrofluoric acid liberated may be absorbed in alkalies, or in barium sulphate containing chalk.

237,294. Dyes. Farbwerke vorm. Meister, Lucius, und Brüning, Hoechst-on-Main, Germany. International Convention date, July 21, 1924.

The dianhydride of naphthalene-1 : 4 : 5 : 8-tetracarboxylic acid or the acid, or its substitution products may be condensed with *o*-diamines or their salts, with or without a solvent or diluent, to obtain vat dyestuffs. In an example, *o*-phenylene diamine may be used.

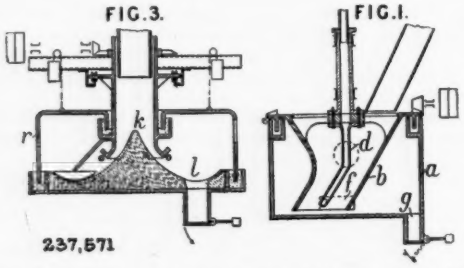
237,295. Dyes. Durand et Huguenin Soc. Anon., Basle, Switzerland. (Assignees of M. Bader, 48, Boulevard du Maréchal Pétain, Mulhouse, and C. Sunder, 9, Rue de Ferrette, Mulhouse, France. International Convention date, July 21, 1924. Addition to 186,057.

Specification 186,057 (see The Chemical Age, Vol. VII, p. 716) describes the conversion of leuco compounds of vat dyes into esters of polybasic acids by treating with an acid halide in presence of a tertiary base. The latter is now replaced by a primary or secondary base such as aniline or monoethyl-aniline. Thus, leucothioindigo suspended in a mixture of aniline and chlorbenzene at -10°—0° C. is treated with chlorsulphonic acid.

237,567. Cellulose Esters. Soc. Chimique des Usines du Rhône, 21, Rue Jean-Goujon, Paris. International Convention date, July 28, 1924.

Cellulose which is to be esterified is subjected to a preliminary treatment with a small quantity of acetic acid, which forms with the moisture in the cellulose, an acid of 70–85 per cent. strength. Alkali-treated cellulose is particu-

larly suitable for treatment by this process, e.g., mercerised cellulose, cellulose extracted by the soda process, or cellulose bleached by alkaline bleaching agents. In an example, mercerised cotton is stirred with 11 per cent. of acetic acid for two hours, and then treated with excess of acetic acid containing 0·5 per cent. of sulphuric acid at 45° C. Acetic anhydride is then added, and the temperature maintained at 50°–60° C. Wood waste which has been purified by treating with strong caustic soda solution, and cotton which has been bleached by sodium hypochlorite, may be similarly treated.



237,571. TREATING SOLIDS WITH LIQUIDS. A. Ramen, Löfste, near Upsala, Sweden. International Convention date, July 23, 1924.

Roasted ore is fed through a rotating mouthpiece *b* into a container *a*, and liquid is fed through the pipe *d*. The treated material is pushed by a scraper *f* towards the outlet *g*. In a modification, the material is treated in an annular trough *l* having a central conical part *k* projecting into the mouthpiece. The container comprises a counterweighted bell *r*.

237,573. KETENS. Ketoid Co., 7, West 10th Street, Wilmington, Del., U.S.A. Assignees of D. A. Nightingale, Butler Pike, Ambler, Pa., U.S.A. International Convention date, July 22, 1924.

Acetone, acetic anhydride, and the like, are heated to about 635° C. in the presence of metallic sulphates to obtain ketens. Sulphates employed are those which are stable at 700° C., preferably aluminium sulphate, mounted on an asbestos carrier. Other suitable sulphates include those of chromium, manganese, calcium, barium, strontium, magnesium, and silver. Another suitable material is made by moulding a paste of dry Portland cement and hot dilute sulphuric acid into cakes, which are dried and baked.

237,574. ACETYL SALICYLIC ACID. Ketoid Co., 7, West 10th Street, Wilmington, Del., U.S.A. Assignees of D. A. Nightingale, Butler Pike, Ambler, Pa., U.S.A. International Convention date, July 22, 1924.

Salicylic acid is dissolved in an inert solvent such as dry ethyl ether and keten passed into it to saturation. The ether is evaporated, leaving acetyl salicylic acid crystals.

237,575. ACETIC ANHYDRIDE. Ketoid Co., 7, West 10th Street, Wilmington, Del., U.S.A. Assignees of D. A. Nightingale, Butler Pike, Ambler, Pa., U.S.A. International Convention date, July 22, 1924.

Acetic anhydride is obtained by passing keten into glacial acetic acid. A solution of keten in the anhydride is ultimately obtained.

237,590. SYNTHETIC DRUGS. F. Hoffman La Roche and Co., 184, Grenzacher Strasse, Basle, Switzerland. International Convention date, July 23, 1924.

Molecular compounds of dialkyl or aryl alkyl barbituric acid and 1-phenyl-2:3-dimethyl-4-dimethylamino-5-pyrazolone are obtained by intimate mixing and heating. Examples are given.

237,591. CELLULOSE ACETATE. Ketoid Co., 7, West 10th Street, Wilmington, Del., U.S.A. Assignees of D. A. Nightingale, Butler Pike, Ambler, Pa., U.S.A.

Cellulose or hydrocellulose is treated with keten, with or without an inert solvent such as benzene, toluene, kerosene, etc., or glacial acetic acid or acetic anhydride to moisten the cellulose. A catalyst, such as zinc chloride, chlorsulphonic acid, benzene sulphonic acid, or sulphuric acid may be added to the liquid moistening agent. Cotton, paper, wood pulp, wood flour, straw, jute, or regenerated cellulose, may be treated by this process.

LATEST NOTIFICATIONS.

239,833. Dehydrating-apparatus. A. Lozai. September 10, 1924.
239,841. Method and apparatus for the continuous distillation of tar and like substances and for the continuous rectifying of their by-products. C. Ab-der Halden. September 13, 1924.
239,846. Process of treating gases containing sulphuretted hydrogen and sulphur dioxide. Orkla Grube-Aktiebolag. September 10, 1924.
239,849. Manufacture of rubber-containing mixtures and articles thereof. Naugatuck Chemical Co. September 15, 1924.
239,878. Process for refining decamphorated oil of turpentine. Farbwerke vorm. Meister, Lucius, und Brüning. September 12, 1924.

Specifications Accepted with Date of Application

218,271-2. Concentrated acetic acid from diluted acetic acid, Manufacture of. H. Suida. June 26, 1923. 218,272, addition to 218,271.
218,277. Synthetic resins and process of making the same. C. O. Terwilliger. June 29, 1923.
220,602. Aluminium-copper-silicon alloy and method of producing same. Vereinigte Aluminium-werke Akt.-Ges. August 16, 1923.
222,103. Vulcanising rubber, Process for—and the product obtained thereby. H. O. Chute. September 18, 1923.
222,876. Burning, reducing, roasting or like treatment of materials, such as fuel and ores. X. de Spirlet. October 3, 1923.
224,509. Sulphite cellulose waste liquor, Process for the treatment of. C. G. Schwalbe. November 6, 1923.
228,512. Sulphite cellulose lye, Method of utilising. C. G. Schwalbe. January 30, 1924.
227,097. Materials containing sulphur which solidify when cold, Production of. W. Eberlein. January 4, 1924.
229,640. Sodium bicarbonate and sal-ammoniac, Process for the production of. Ges. für Kohlentechnik. February 21, 1924.
234,122. Phosphoric acid free from arsenic, Process for the preparation of. E. Merck. May 14, 1924.
239,257. Conversion of lead sulphate into lead carbonate. S. C. Smith. May 5, 1924.
239,280. Gas, Manufacture of. Humphreys and Glasgow, Ltd., and J. C. Stelfox. June 4, 1924.
239,304. Fibrous cellulose, Treatment of—for the production of hydrated derivatives. W. Bacon and I. P. M. Syndicate, Ltd. June 14, 1924.
239,320. Alkyl ethers of nitro phenols, Manufacture of. H. G. C. Fairweather (*National Aniline and Chemical Co., Inc.*). July 15, 1924.
239,363. Arsenical salts, Methods of making. S. J. Lloyd and A. M. Kennedy. September 15, 1924.
239,397. Sulphuric acid, Chambers used in the manufacture of. W. G. Mills and J. Packards and Fison (Thetford), Ltd. November 17, 1924.
239,404. Metals and alloys, Process for producing. T. R. Haglund. November 26, 1924.
239,470. Dyeing or colouring of products or articles made with cellulose acetate. British Celanese, Ltd., and G. H. Ellis. April 4, 1924.
234,039. Viscose, Process of making. F. Kempter. May 15, 1924.

Applications for Patents

Akt.-Ges. für Anilin-Fabrikation and Bloxam, A. G. Production of fast dyeings on the fibre. 23,251. September 17.
Denis, J. Process of treating waste liquors containing cyanogen compounds. 23,350. September 18.
Dolter, H. Manufacture of earth metals by electrolysis. 23,137. September 16. (France, September 17, 1924).
Du Pont De Nemours and Co., E. I. and Marks, E. C. R. Process for treating rubber, etc. 23,231. September 17.
Du Pont De Nemours and Co., E. I. and Marks, E. C. R. Accelerators for rubber vulcanisation. 23,232. September 17.
Ellis, G. B. and Soc. pour la Fabrication de la Soie Rhodiaseta. Apparatus for manufacture of artificial silk. 23,322. September 18.
Empson, A. W. Centrifugal separators. 23,034. September 15.
Farbwerke vorm. Meister, Lucius, und Brüning. Manufacture of a blue dyestuff. 23,246. September 17. (Germany, September 20, 1924.)
Köln-Rottweil Akt.-Ges. Manufacture of cellulose. 23,343. September 18. (Germany, October 17, 1924).
Quick, A. S. Process for refining and decolorising oils and fats. 23,116. September 16.
Rupe, H. Manufacture of hydrocyclic-ω-amino-alkyl compounds. 22,892. September 14. (Switzerland, October 1, 1924).
Soc. Chimique des Usines du Rhone. Manufacture of plastic materials. 23,434. September 19. (France, October 27, 1924.)
Thomas, J. and Thomson, R. F. Colouring-matters. 23,229. September 17.
Weller, H. O. Manufacture of cements and concretes. 22,940. September 14.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, September 25, 1925.

THERE is little of special interest to report in this market, the demand being much about the same. It is noticed in some directions that a better interest is being taken in forward business and it would appear that present prices afford a favourable opportunity for this.

Prices on the whole are steady. The export market still remains quiet.

General Chemicals

ACETONE has been in constant request and stocks appear to be small. Price is unchanged at £75 to £76 per ton.

ACID ACETIC.—A quietly steady business has been transacted, the price showing no change at £37 to £37 10s. per ton for technical and £38 10s. to £40 for the pure 80%.

ACID FORMIC has been in better request and stocks are light; to-day's price is £47 10s. to £48 10s. for the 85% technical, ex wharf.

ACID LACTIC—Price is very firm and inquiry is improving.

ACID OXALIC.—A steady business has been put through and the price is steady at about 3¾d. per lb.

ALUMINA SULPHATE.—A fair amount of business has been transacted and price seems to be as low as it is likely to go.

AMMONIUM CHLORIDE.—There has been a fair business booked for the 98/100% fine white crystals and price is firm.

ARSENIC.—Some inquiry is in the market for shipment, but generally at unworkable limits; there is practically no demand for home trade and price is again easier.

BARIUM CHLORIDE.—The demand is not quite so active and price for forward is a shade easier; spot price stands to-day at £9 per ton.

EPSOM SALTS.—A good business is passing in this product, with price steady at £5 to £5 5s. per ton.

FORMALDEHYDE.—It is satisfactory to report a better demand for this product; stocks are extremely light and price firm at £41 to £42; the forward position is also extremely firm.

LEAD ACETATE.—Quite a good business is passing, and with the recovery in the metal prices for the acetate are again firmer; white is quoted at £45 10s. to £46 per ton and £40 to £41 per ton for the brown.

LIME ACETATE.—No change can be reported for this market the price remaining at £15 10s. for 80%.

LITHOPONE.—A fair business is passing in this product at £19 to £22 per ton, according to quantity and quality.

POTASSIUM CAUSTIC.—A small business is passing at unchanged price.

POTASSIUM CARBONATE is in better request and price slightly firmer.

POTASSIUM CHLORATE, after being slightly easier, is again firmer, and is in short supply; spot stocks command about 4¼d. per lb. and there is a heavy demand especially on export account.

POTASSIUM PERMANGANATE continues easy with demand on the small side.

POTASSIUM PRUSSIATE has been in much better request and stocks are extremely light with price remaining firm at 7½d. per lb. A fair amount of business for forward has been transacted and makers are occupied for some time ahead.

SODIUM ACETATE is only in small request and price is now steadier at £17 5s. to £17 10s. per ton.

SODIUM BICHROMATE.—A steady business is passing at British makers' figures.

SODIUM PRUSSIATE maintains its firm position and there is plenty of inquiry both for prompt and forward; price is firm at 4¾d. to 4¼d.

SODIUM NITRITE is in good request for prompt delivery and price is unchanged at £22 10s.

SODIUM SULPHIDE.—Dull and the price is easy.

ZINC SULPHATE is unchanged.

Coal Tar Products

There is very little change to report in the market for Coal Tar Products from last week.

90% BENZOL is quoted at 1s. 8d. to 1s. 8½d. per gallon, on rails.

PURE BENZOL is steady at 1s. 11d. to 2s. per gallon, on rails.

CREOSOTE OIL is firm at 5¾d. per gallon, on rails in the North, and 7d. per gallon, on rails in the South.

CRESYLIC ACID is unchanged, and is quoted at 1s. 6d. to 1s. 6½d. per gallon, on rails, for the pale quality 97/99%, while the dark quality 95/97% can be obtained at 1s. 1d. per gallon, on rails.

SOLVENT NAPHTHA is steady at 1s. 5d. to 1s. 5½d. per gallon, on rails.

HEAVY NAPHTHA is quiet, and can be bought at 1s. 1d. to 1s. 2d. per gallon.

NAPHTHALENES are unchanged, the lower grades being worth from £3 to £3 10s. per ton, 74/76 quality £5 per ton, and 76/78 quality £5 per ton.

PITCH remains dull, and prices are unchanged at 40s. to 42s. 6d. f.o.b. London; 37s. 6d. to 40s. f.o.b. East Coast port.

Latest Oil Prices

LONDON.—LINSEED OIL inactive. Crude crushed, £49; technical refined, £52. COTTON OIL steady. Refined common edible, £48; Egyptian crude, £42 10s.; deodorised, £50. TURPENTINE quiet and 3d. per cwt. lower. American, spot, 79s.; October-December, 79s. 9d., and January-April, 82s., paid and sellers.

HULL.—LINSEED OIL.—Naked, spot, £40 5s.; September-October, £40 2s. 6d.; October-December, £39 15s.; January-April, £39 10s. COTTON OIL.—Naked, Bombay crude, £38 10s.; Egyptian crude (new), £41 10s.; ditto (old), £40; edible refined, £44 5s.; deodorised, £49; technical, £42 5s. PALM KERNEL OIL.—Crushed naked, 5½ per cent., £43. GROUNDNUT OIL.—Crushed/extracted, £47; deodorised, £51. SOYA OIL.—Extracted and crushed, £42; deodorised, £45 10s. RAPE OIL.—Extracted, £48 per ton net, cash terms, ex mill. CASTOR OIL and COD OIL unaltered.

Nitrogen Products Market

Export.—During the last week the demand for sulphate of ammonia has continued good, and producers both here and on the continent have been able to dispose of available quantities on the basis of £11 15s. per ton f.o.b. in single bags. The small stock now carried in almost all countries indicates that as the season advances, the producers will have no difficulty in raising prices.

Home.—The home sales are small, as is normal for this period of the year. There are several indications of added interest in fertilisers, and it is expected that the home season will be a heavy one.

Nitrate of Soda.—The nitrate market contines firm. The demand for nitrogen in all forms has clearly shown that there is an ample market for the huge increased production, and the synthetic scare which affected nitrate producers for a time has been dissipated. Cargoes c.i.f. European ports have changed hands from £11 to £11 5s. per ton. It is anticipated that the nitrogen producers will be able to advance this price as the season grows nearer.

Concentration of Fluorspar Ores

AN investigation to determine possible improvements in the milling of fluorspar is being conducted by the U.S.A. Bureau of Mines. A study has been made of tailings from concentrating mills in Southern Illinois, and the material subjected to experimental classification, and concentration with jigs and tables in order to determine its behaviour. Sufficient progress has been made to indicate that considerable improvement in concentration and more economical recovery may be effected.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£20 per ton.

Acid Boric, Commercial.—Crystal, £40 per ton, Powder, £42 per ton.

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations : 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £10 10s. d/d ; Contract, £9 10s. d/d, 4 ton lots.

Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.

Copper Sulphate.—£25 to £25 10s. per ton.

Methylated Spirit 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d.

Nickel Ammonia Sulphate.—£38 per ton d/d.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5d. per lb.

Potassium Chlorate.—3¾d. per lb., ex wharf, London, in cwt. kegs.

Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.

Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.

Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength ; 20s. less for contracts.

Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£21 per ton.

Sodium Bicarbonate.—£10 10s. per ton, carr. paid.

Sodium Bichromate.—4d. per lb.

Sodium Bisulphite Powder 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Phosphate, £14 per ton, f.o.r. London, casks free.

Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.

Sodium Sulphide conc. solid. 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. pd.

Sodium Sulphide Crystals.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. pd.

Sodium Sulphite, Pea Crystals.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—4¾d. per lb. Crude 60's, 1s. 3d. to 1s. 4d. Rather more inquiry.

Acid Cresylic 97/99.—1s. 5d. to 1s. 6d. per gall. Steady, with more inquiry. Pale, 95%, 1s. 3d. to 1s. 5d. per gall. Dark, 1s. 3d. to 1s. 6d. per gall.

Anthracene Paste 40%.—3d. per unit per cwt.—Nominal price. No business.

Anthracene Oil, Strained.—7½d. per gall. Unstrained, 6½d. per gall.

Benzol.—Crude 65's.—11d. to 1s. 3d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 2s. 1½d. to 2s. 3d. per gall., ex works in tank wagons. Firm.

Toluol.—90%, 1s. 8d. to 1s. 9d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall.

Xylol Commercial.—1s. 9½d. to 2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8½d. per gall. Market very quiet. Standard specification, middle oil, heavy, 5¾d. to 6d. per gall. Market steady.

Naphtha.—Solvent 90/160, 1s. 5d. to 1s. 6½d. per gall. Fair business. Solvent 90/190, 1s. to 1s. 4d. per gall. Fair demand.

Naphthalene Crude.—Drained Creosote Salts, £3 5s. to £3 10s. per ton. Market quiet. Whizzed or hot pressed, £5, but no demand.

Naphthalene.—Crystals and Flaked, £10 to £11 per ton, according to districts. Very quiet.

Pitch.—Medium soft, 36s. to 40s. per ton, according to district. More inquiry. Market more active.

Pyridine.—90/160, 19s. 6d. to 20s. per gall. Fair demand. Heavy, 11s. to 11s. 6d. per gall. Market quiet.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid Anthranilic.—7s. per lb. 100%.

Acid Benzoic.—1s. 9d. per lb.

Acid H.—3s. 6d. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.

Acid Neville and Winther.—4s. 10d. per lb. 100% basis d/d.

Acid Sulphanilic.—9d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—10d. per lb. d/d.

Aniline Oil.—7d. to 7½d. per lb. naked at works.

Aniline Salts.—7d. to 8d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzaldehyde.—2s. 1½d. per lb. Good home inquiry.

Benzidine Base.—3s. 6d. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

p-Chlorphenol.—4s. 3d. per lb. d/d.

p-Chloraniline.—3s. per lb. 100% basis.

o-Cresol 29/31° C.—3d. per lb. Demand quiet.

m-Cresol 98/100%.—2s. 1d. per lb. Demand moderate.

p-Cresol 32/34° C.—2s. 1d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. per lb.

Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.

Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.

Dimethylaniline.—2s. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. per lb. naked at works.

Dinitrochlorbenzene.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

G. Salt.—2s. 2d. per lb. 100% basis d/d.

a-Naphthol.—1s. 10d. per lb. d/d. Fair home inquiry.

B-Naphthol.—1s. per lb. d/d. Fair home inquiry.

a-Naphthylamine.—1s. 3d. per lb. d/d. Fair home inquiry.

B-Naphthylamine.—3s. 9d. per lb. d/d. Fair home inquiry.

m-Nitraniline.—3s. 9d. per lb. d/d.

p-Nitraniline.—1s. 11d. per lb. d/d. Fair home inquiry.

Nitrobenzene.—5d. per lb. naked at works. Good home inquiry.

o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.

Nitronaphthalene.—10d. per lb. d/d.

p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.

p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.

m-Phenylene Diamine.—4s. per lb. d/d.

p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.

R. Salt.—2s. 4d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.

o-Toluidine.—8d. per lb. Good home inquiry.

p-Toluidine.—2s. 3d. per lb. naked at works.

m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Acetate of Lime.—Brown £9 10s. to £10. Quiet market. Grey, £15 per ton. Liquor, 9d. per gall. 32° Tw.

Acetone.—£73 per ton.

Charcoal.—£7 5s. to £8 10s. per ton, according to grade and locality.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall, 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 9d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s. 3d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P.

Wood Tar.—£4 per ton.

Brown Sugar of Lead.—£43 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7¼d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.

Arsenic Sulphide, Yellow.—2s. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—4s. 4d. per lb.

Carbon Bisulphide.—£25 to £28 per ton, according to quantity.

Carbon Black.—5½d. per lb., ex wharf.

Carbon Tetrachloride.—£55 to £60 per ton, according to quantity, drums extra.

Chromium Oxide, Green.—1s. 3d. per lb.

Diphenylguanidine, 4s. to 4s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5¾d. to 6¾d. per lb.

Lamp Black.—£43 per ton, barrels free.

Lead Hyposulphite.—9d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£13 12s. 6d. per ton f.o.r. London.

Sulphur.—£9 to £11 per ton, according to quality.

Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£50 to £55 per ton.
Thiocarbamide.—2s. 6d. to 2s. 9d. per lb.
Thiocarbanilide.—2s. 1d. to 2s. 3d. per lb.
Vermilion, Pale or Deep.—5s. per lb.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic, 80 % B.P.—£39 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 5d. to 2s. 9d. per lb. Keen competition continuing. Good demand.
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.
Acid, Boric B.P.—Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 3¾d. per lb. Market firmer.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots.
Acid, Pyrogallic, Crystals.—5s. 4d. to 5s. 6d. per lb.
Acid, Salicylic.—1s. 3½d. to 1s. 5d. per lb. Technical.—10½d. to 11d. per lb.
Acid, Tannic B.P.—2s. 8d. per lb.
Acid, Tartaric.—1s. 0½d. per lb. Market firmer.
Amidol.—6s. 6d. per lb., d/d.
Acetanilide.—1s. 5d. per lb. for quantities.
Amidopyrin.—13s. 3d. per lb.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—11s. 6d. per oz. for English make.
Barbitone.—10s. 3d. to 10s. 6d. per lb. Lower owing to increased supplies.
Benzonaphthol.—3s. 6d. per lb. spot.
Bismuth Carbonate.—12s. 9d. to 14s. 9d. per lb.
Bismuth Citrate.—11s. 4d. to 13s. 4d. per lb.
Bismuth Salicylate.—10s. 2d. to 12s. 2d. per lb.
Bismuth Subnitrate.—10s. 9d. to 12s. 9d. per lb. according to quantity.
(Prices advanced. Supplies of the metal much easier.)
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 10d. to 2s. 1d. per lb.; sodium, 2s. to 2s. 3d. per lb.; ammonium, 2s. 4d. to 2s. 7d. per lb., all spot. British or Imported. Firm.
Calcium Lactate.—1s. 3d. to 1s. 6d., according to quantity.
Chloral Hydrate.—3s. 5d. to 3s. 6d. per lb., duty paid.
Chloroform.—2s. 5½d. to 2s. 7½d. per lb., according to quantity.
Creosote Carbonate.—6s. 9d. per lb.
Formaldehyde.—£41 per ton, in barrels ex wharf.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
Guaiacol Carbonate.—6s. to 7s. per lb.
Hexamine.—2s. 3d. powder crystal, 2s. 5d. free running crystal, per lb.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.
Hydroquinone.—4s. 4½d. per lb., in cwt. lots.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 8d. to 1s. 11d. per lb. Green, 2s. 2d. to 2s. 7d. per lb. U.S.P., 1s. 7d. to 1s. 10d. per lb.
Magnesium Carbonate.—Light Commercial, £34 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £24 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 42s. 6d. net per lb., October delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make.
Mercurials.—Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb. Still quiet.
Methyl Salicylate.—1s. 5d. to 1s. 8d. per lb. Demand increasing, price firmer.
Methyl Sulphonal.—16s. 9d. to 17s. per lb. Demand limited.
Metol.—9s. per lb. British make.
Paraformaldehyde.—1s. 9d. for B.P. quality.
Paraldehyde.—1s. 4½d. per lb., in free bottles and cases.
Phenacetin.—4s. to 4s. 3d. per lb.
Phenazone.—6s. to 6s. 3d. per lb. Spot lower than forward price.
Phenolphthalein.—4s. to 4s. 3d. per lb. Supply exceeds demand.
Potassium Bitartrate 99/100% (Cream of Tartar).—78s. per cwt., less 2½% for ton lots. Market firmer.
Potassium Citrate.—1s. 7d. to 1s. 10d. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7¾d. per lb., spot. Firmer.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—3s. 10½d. per lb. In fair quantities.
Saccharin.—63s. per lb. in 50 lb. lots.
Salol.—3s. 3d. to 3s. 6d. per lb.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.
Sodium Citrate, B.P.C., 1911.—1s. 4d. to 1s. 7d. per lb., B.P.C., 1923. 1s. 7d. to 1s. 8d. per lb., according to quantity. U.S.P., 1s. 7d. to 1s. 10d. per lb.
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
Sodium Salicylate.—Powder, 1s. 10¾d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 1d. per lb. Flake, 2s. 1d. to 2s. 4d. per lb. Prices cut fine: keen competition.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.
Sulphonal.—12s. 3d. to 12s. 6d. per lb. Limited demand.
Thymol.—9s. 6d. to 12s. 6d. per lb.

Perfumery Chemicals

Acetophenone.—9s. per lb.
Aubepine (ex Anethol).—10s. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 1½d. per lb.
Anethol (M.P. 21/22° C.).—5s. 9d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 4d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 4d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—2s. 9d. per lb.
Cinnamic Aldehyde Natural —15s. 6d. per lb.
Coumarin.—13s. per lb.
Citronellol.—19s. per lb.
Citral.—10s. per lb.
Ethyl Cinnamate.—9s. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—9s. 6d. per lb.
Geraniol (Palmarosa).—27s. per lb.
Geraniol.—8s. to 16s. per lb.
Heliotropine.—6s. 3d. per lb.
Iso Eugenol.—14s. 6d. per lb.
Linalol ex Bois de Rose.—19s. 6d. per lb.
Linalyl Acetate.—18s. 6d. per lb.
Methyl Anthranilate.—9s. 3d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ketone.—30s. per lb.
Musk Xylol.—7s. per lb.
Nerolin.—4s. per lb.
Phenyl Ethyl Acetate.—14s. per lb.
Phenyl Ethyl Alcohol.—12s. per lb.
Rhodinol.—36s. 6d. per lb.
Safrol.—1s. 8d. per lb.
Terpineol.—1s. 8d. per lb.
Vanillin.—23s. 9d. per lb.

Essential Oils

Almond Oil.—12s. 6d. per lb.
Anise Oil.—3s. 6d. per lb.
Bergamot Oil.—27s. 6d. per lb.
Bourbon Geranium Oil.—16s. per lb.
Camphor Oil.—60s. per cwt.
Cananga Oil, Java.—11s. 3d. per lb.
Cinnamon Oil, Leaf.—5d. per oz.
Cassia Oil, 80/85%.—9s. 9d. per lb.
Citronella Oil.—Java, 85/90%, 3s. 7d.; Ceylon, 2s. 3d. per lb.
Clove Oil.—7s. 6d. per lb.
Eucalyptus Oil, 70/75%.—1s. 10d. per lb.
Lavender Oil.—French 38/40% Esters, 27s. 6d. per lb.
Lemon Oil.—6s. 9d. per lb. 7s. asked for forward shipment.
Lemongrass Oil.—4s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.
Otto of Rose Oil.—Bulgarian, 60s. per oz. Anatolian, 35s. per oz.
Palma Rosa Oil.—13s. 9d. per lb.
Palma Rose Oil.—15s. 3d. per lb.
Peppermint Oil.—Wayne County. No good quality material available. Japanese, 26s. per lb. Much firmer.
Petitgrain Oil.—9d. per lb.
Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, September 25, 1925.

BUSINESS in the heavy chemical market continues fairly satisfactory, there being good inquiry both for home and export.

Prices remain about the same, with the notable exceptions of lead and zinc compounds which are all higher.

Industrial Chemicals

ACID ACETIC.—In moderate request and price unchanged. 98/100 % glacial, £56 to £67 per ton, according to quality and packing c.i.f. U.K. ports. 80 % pure, £40 to £42 per ton. 80 % technical, £39 to £41 per ton packed in casks c.i.f. U.K. ports.

ACID BORIC.—Crystal granulated or small flaked, £40 per ton; powdered, £42 per ton, packed in bags carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—In moderate demand and prices rather easier at 4¾d. to 5d. per lb. delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Still further reduced in price. Now quoted 1s. 3¼d. per lb. less 5% ex store. Offered for prompt shipment at about 1s. 3d. per lb. less 5% ex wharf.

ACID FORMIC 85%.—Now quoted £47 10s. per ton ex wharf.

ACID HYDROCHLORIC.—In little demand. Price, 6s. 6d. per carboy ex works.

ACID NITRIC 80°.—Remains unchanged at £23 5s. per ton ex station, full truck loads.

ACID OXALIC 98/100%.—Spot material unchanged about 3½d. per lb. ex store. Offered for prompt shipment from the continent at a fraction less.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In moderate demand and price unchanged at about 11¾d. per lb. less 5% ex store. Offered for forward delivery at 11¼ per lb. less 5% ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—Quoted £6 15s. per ton ex store, spot delivery. Offered for prompt shipment from the continent at £6 5s. per ton c.i.f. U.K. ports.

ALUM, LUMP POTASH.—Spot material unchanged at £9 5s. per ton ex store. Offered for early shipment from the continent at about £8 per ton c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Moderate demand and price unchanged at 1s. 4½d. per lb. less 5% ex station. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton. Packed in 5 cwt. casks delivered U.K. ports.

AMMONIA LIQUID, 880°.—In usual steady demand and price unchanged at 2¾d. to 3d. per lb. delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals quoted £28 per ton ex station for English material. Offered from the continent at about £23 10s. per ton c.i.f. U.K. ports. Fine white crystals offered from the continent at £19 5s. per ton c.i.f. U.K. ports.

ARSENIC, REFINED WHITE CORNISH.—In very poor demand. Spot lots now quoted £24 per ton ex store. Offered for early delivery at about £23 5s. per ton ex wharf.

BARIUM CHLORIDE. — Large crystals quoted £9 10s. per ton ex store. On offer at £8 5s. per ton c.i.f. U.K. ports to come forward. Fine white crystals quoted about £7 5s. per ton c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots English material £10 10s. per ton ex station. Contracts 20s. per ton less. On offer from the continent at about £8 7s. 6d. per ton c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton ex works. Continental quoted £5 per ton c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton powdered, £26 per ton. Carriage paid U.K. stations minimum ton lots.

CALCIUM CHLORIDE.—English manufacturers' prices unchanged at £5 12s. 6d. to £5 17s. 6d. per ton carriage paid U.K. stations. Continental on offer at about £3 17s. 6d. per ton c.i.f. U.K. ports.

COPPERAS, GREEN.—In good deland for export. Prices unchanged at about £3 7s. 6d. per ton f.o.b. U.K. ports, packed in casks.

COPPER SULPHATE.—Spot material available at about £23 10s. per ton ex wharf. English for export quoted £24 10s. per ton f.o.b. U.K. ports.

FORMALDEHYDE 40%.—Unchanged at about £40 per ton ex store. Offered for prompt shipment from the continent at about £39 per ton c.i.f. U.K. ports.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 17s. 6d. per ton c.i.f. U.K. ports.

LEAD, RED.—Prices for spot material advanced to about £45 per ton, ex store. Quoted £43 15s. c.i.f. U.K. ports, prompt shipment from the continent.

LEAD, WHITE.—Now quoted £45 per ton, ex store, spot delivery.

LEAD, ACETATE.—White Crystals, spot material now quoted £4 per ton, ex store; Brown about £43 per ton, ex store. White Crystals on offer from the continent at £43 15s. per ton c.i.f. U.K. ports; Brown about £38 10s. per ton, c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—In moderate demand and price unchanged at about £8 15s. per ton, ex station.

POTASH CAUSTIC, 88/92%. Quoted £27 10s. per ton, c.i.f. U.K. ports. Limited quantities of spot material available at about £30 per ton, ex store.

POTASSIUM BICHROMATE.—Prices for home consumption 5d. per lb., delivered.

POTASSIUM CARBONATE.—Offered for prompt shipment from the continent at £26 per ton, c.i.f. U.K. ports. Spot material quoted £27 per ton, ex store.

POTASSIUM CHLORATE, 99/100%.—Quoted £32 per ton, c.i.f. U.K. ports. Offered for October delivery at slightly less.

POTASSIUM NITRATE, SALTPETRE.—99% refined granulated quoted at about £24 10s. per ton, c.i.f. U.K. ports. Spot material quoted £27 per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at 7¾d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Offered from the continent at 7¼d. per lb., ex wharf. Spot material quoted 7½d. per lb., ex store.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 12s. 6d. per ton. Broken, 60%, £17 2s. 6d. per ton. Powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Quoted £18 15s. per ton, ex store. Spot delivery. On offer from the continent at about £17 15s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM CARBONATE, SODA CRYSTALS.—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more: Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £9 10s. per ton, ex station, minimum 4 ton lots. Pea crystals, £14 per ton, ex station. Continental quoted £9 10s. per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRATE, 100%.—Quoted £24 per ton, ex store. Offered from the continent about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Spot lots quoted at 4d. per lb., ex store. Continental material quoted ex wharf at about the same figure.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English material: Solid, 60/62%, now £13 per ton; broken, £14 per ton; flake, £15 per ton. Crystals, £8 10s. per ton. Carriage paid U.K. stations, minimum 4 lots with slight reductions for contracts to the end of the year. 60/62% solid offered from the continent at £10 15s. per ton, c.i.f. U.K. ports; broken, £1 per ton more; 30/32% crystals, £7 15s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £10 10s.; roll, £9 10s.; rock, £9 7s. 6d.; ground, £9 10s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE, 98/100%.—Quoted from the continent at £24 5s. per ton, c.i.f. U.K. ports. 97/98% of English manufacture at £25 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Fine white crystals quoted £12 10s. per ton, c.i.f. U.K. ports.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

DIMETHYLANILINE.—2s. to 2s. 1d. per lb. Good home inquiries.

BETA NAPHTHOL.—1s. per lb. Some home inquiries.

ALPHA NAPHTHYLAMINE.—1s. 3d. per lb. Some home inquiries.

PARATOLUIDINE.—2s. 6d. per lb. Fair home inquiries.

German Calcium Chloride Price Reduction

REPORTS state that the syndicate formed by German manufacturers of calcium chloride has reduced the price by $1 a ton, making the inside figure $20. It is officially reported that the calcium carbide production in Germany now amounts to about 90,000 tons annually, or twice the pre-war production.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, September 24, 1925.

There has been very little alteration in the condition of things on the Manchester market during the week. Trade is still confined within comparatively narrow limits and although one or two sellers have reported an increase in the volume of their sales, others find business quiet. In one or two sections prices have eased a little bit; taking them all round, quotations have kept up very well, few important changes having to be recorded. Up to the present there is little or no sign of the autumn revival which was looked for in some of the principal chemical-consuming industries.

Heavy Chemicals

Glauber salts are still a quiet section and values are on the easy side, though nominally unchanged at £3 10s. per ton. Saltcake is on offer at £3 10s. to £3 12s. 6d. per ton, but the demand for this material is slow. Chlorate of soda meets with a moderate demand at 2¾d. per lb. A fair business is being done in caustic soda for both branches of trade and values are firm at from £15 12s. 6d. per ton for 60 per cent. to £18 for 76-77 per cent. material. Alkali is also in quietly steady request with prices maintained at about £6 15s. per ton. Hyposulphite of soda is attracting only a moderate amount of attention at round £9 per ton for commercial quality and £14 10s. to £15s. for photographic crystals. Bleaching powder is still quoted at £9 10s. per ton, but the demand is not too active. Acetate of soda is quiet and easy though quotably unchanged from last week at £18 per ton. Sulphide of soda is only in moderate inquiry at about £12 per ton for 60-65 per cent. concentrated solid and £9 5s. for commercial quality. Soda crystals are steady and in fair request at about £5 5s. per ton. Phosphate of soda is rather a slow seller, though values still range from £12 to £12 10s. per ton. Bicarbonate of soda is quoted at £10 10s. per ton, but the demand is quiet. Prussiate of soda is in moderate request at about 4d. per lb.

Caustic potash and carbonate of potash are both a shade easier, with inquiry on a moderate scale. Caustic is quoted round £29 per ton and carbonate at about £25 for 96-98 per cent. material. Chlorate of potash is still on offer at about 4d. per lb. and a fair business is being done. Permanganate of potash keeps fairly steady, but the demand is slow; commercial quality is quoted at round 6d. per lb. and pharmaceutical at 7¾d. to 8d. Yellow prussiate of potash is quiet but steady at 7¼d. per lb. Bichromate of potash is maintained at 5d. per lb., but only a comparatively small amount of business is being done.

Sulphate of copper is steady at £24 10s. per ton and some sellers report a slightly improved feeling about the market. Arsenic, however, continues to attract small attention from buyers, either for home or export, and values are weak at about £19 per ton on rails in Cornwall and £22 to £23 in Manchester. Epsom salts are inactive, though quotations are unchanged from last report at £3 15s. per ton; magnesium sulphate, B.P. quality, is quoted at round £5 5s. per ton. Nitrate of lead is rather slow at £41 per ton. Acetate of lead is steady, but the demand is quiet; white is offering at round £45 and brown material at £40 to £41 per ton. Acetate of lime is not much sought after by buyers; grey is quoted at £14 to £14 10s. per ton and brown at about £7 10s.

Acids and Coal Tar Products

Most of the acids are slightly easier and business is inactive. Acetic acid, 80 per cent. commercial quality, is quoted at £37 and glacial at about £66. Oxalic acid is still offering at 3¾d. per lb., but the demand is no better. Tartaric acid is quiet at about 11½d. per lb. and citric acid is in much the same position at round 1s. 3d.

Among coal-tar products, pitch is selling slowly and values are easy at round 38s. per ton. Naphthalenes are inactive at £13 per ton for refined and £4 and upwards for crude. Carbolic acid is dull at 4¾d. per lb. for crystal and 1s. 4d. per gallon for crude. Creosote oil is quiet but fairly steady at 5¾d. to 6d. per gallon. Solvent naphtha is in small demand at 1s. 5½d. per gallon.

American Market Movements

(From *Drug and Chemical Markets.*)

Heavy chemicals in good demand with prices firm on the great majority. Butyl alcohol lower. Prussiates strong. Formic acid slightly firmer.

Fine chemicals showed few new developments, goods moving in a routine way, and principally at unchanged prices. Interest was evinced in tartaric acid due to German offerings.

Benzene prices are firm and situation is steady despite weakness of gasolene. Pyridine down again. Cresylic acid remains weak. Intermediates in routine demand with prices generally unchanged. Paranitroaniline breaks further.

Death of Lieut.-Colonel Gaskell

After an illness of several weeks, Lieutenant-Colonel James Bellhouse Gaskell died on Sunday night at his residence, Roseleigh, Woolton, aged 74.

Colonel Gaskell was the second son of the late Mr. Holbrook Gaskell, of Woolton, and his early business career was spent in the office of Gaskell, Deacon and Co., the well-known firm of chemical manufacturers established at Widnes by his father, in conjunction with Mr. Henry Deacon. Mr. James B. Gaskell was a partner in the firm when in 1890 it became absorbed in the newly-created United Alkali Company. He was one of the original directors of that organisation, and had a seat on the board until 1922, when he retired solely on account of ill-health. He had a considerable interest in the company. He was also a director of the White Moss Colliery Company, Skelmersdale.

Colonel Gaskell took a consistently keen interest in every activity of the company, and was possessed of a genial, pleasing disposition which earned him a welcome wherever he went. He was largely interested in art and was an enthusiastic collector. Although not a prominent figure in public life, he was for many years an officer in the Militia, and he had been a Justice of the Peace for the West Derby Hundred since 1890.

A New Artificial Silk Group

Particulars have been supplied to us respecting what is known as the "Lampose Group" of mills, an international association of manufacturers of artificial fibres. Membership of the group, we understand, is by application and subject to the requirements of the necessary statutes, and application may be made to Soieries de Strasbourg, S.A., 4, rue de l'Arsenal, Strasbourg, Alsace, France, the leading firm of the group. The general manager is Dr. Emile Bronnert, who has long been associated with artificial silk research and manufacture, and the Manchester firm of Henry Bronnert and Co., 56, Princess Street, in that city, is also connected with the enterprise. The construction of the group's mill is progressing satisfactorily, and it is described as "the most modern mill in existence, complete with the results of 30 years' experience of artificial silk manufacture. The central research laboratories are at Strasbourg, and the group claim to possess special manufacturing methods and new processes for strengthening wet artificial cellulose fibre from 100 to 200 per cent.

Chemicals in the Leather Industry

At the Agricultural Hall, Islington, Necol Industrial Collodions, Ltd., a constituent company of Nobel Industries, Ltd., are exhibiting their leather finishes, enamels and varnishes at the Shoe and Leather Fair. The treatment of leathers with "dope" finishes has been a matter of constant research by Necol Industrial Collodions, Ltd., for many years past, and the application of this class of leather finish, they claim, is now an economic commercial proposition.

The "Necol" products include split leather enamel for coloured upholstery work; coloured grain leather finishes as used by the fancy leather trade; waterproof finishes for hat leathers; fixing and glazing solutions for dyed leathers; patent leather enamel; and a waterproof belting cement. The special feature is the display of "Necol" cracking enamels which produce fashionable effects on fancy leathers, dress shoes, heels, etc. The nature of the ingredients of all "Necol" products renders them absolutely waterproof, and herein lies their great advantage for leather work, whilst, in addition there is no difficulty in providing all types "fast to light, and rubbing."

Company News

BROKEN HILL SOUTH.—A dividend at the rate of 1s. 6d. and a bonus of 2s. are payable on November 17.

KAYE'S RUBBER LATEX PROCESS, LTD.—It is announced that the American rights have been sold to the United States Rubber Co.

AMERICAN CYANAMID CO.—October 1 is the date on which a dividend of $1 per share, plus $½ extra, on the common stock, is to be paid.

PARTINGTON STEEL AND IRON CO., LTD.—The directors are unable to recommend any dividend for the past year on the ordinary or the 6½ per cent. preference shares.

SHAWINIGAN WATER AND POWER CO.—A dividend of $2 per share on the common stock has been declared for the quarter ended September 30, payable on October 10.

PARKES CHEMISTS.—The company announces the payment on September 21 of a dividend on the preference shares for the half-year ended August 31 at the rate of 6 per cent. per annum, less tax.

BRITISH ALUMINIUM CO., LTD.—The directors have resolved that a dividend at the rate of 8 per cent. per annum, less tax, on the ordinary shares for the six months ended June 30 last be paid on October 1. A dividend at the rate of 6 per cent. per annum, less tax, on the preference shares for the six months will also be paid on that date.

ANGLO-CONTINENTAL GUANO WORKS.—For the eighteen months ended June 30 last the accounts show a net profit of £33,101, from which must be deducted the debit balance brought forward, leaving credit balance of £27,741. The debenture interest for the eighteen months amounts to £15,603, leaving a sum of £12,078 to be dealt with. Although the profits show material increase, the directors feel it desirable and prudent to conserve the company finances, and, therefore, for the present do not recommend any dividend distributions. They propose to set aside for depreciation £4,000, for sinking fund for redemption of debentures £2,250, and to carry forward £5,828.

New Chemical Trade Marks

Application for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Mark can be lodged up to October 16, 1925.

"CREOSENE."

459,200. For wood preservatives and wood stains. Alan Johnston and Partner, Abbey House, 10, Victoria Street, Westminster, London, S.W.1; coke and by-products factors. May 23, 1925.

Opposition to the registration of the following Trade Marks can be lodged up to October 23, 1925.

"STELLA."

459,524. For acid soda pyrophosphate for use in manufactures. Joh. A. Benckiser Chemische Fabrik, 30, Frankenthalerstrasse, Ludwigshafen-am-Rhein, Germany; manufacturers. June 6, 1925.

"DEVOLITE."

461,314. For chemical substances used in manufactures, photography or philosophical research and anti-corrosives. Class 1. English China Clays, Ltd., High Cross Street, St. Austell, Cornwall; china clay producers. August 11, 1925. (To be associated. Sect. 24.)

"IRISOL."

461,560. For coal tar dyestuffs. Class 1. Farbenfabriken vorm. Friedr. Bayer and Co. (a joint stock company organised under the laws of Germany), Leverkusen, near Cologne-on-the-Rhine, Germany; manufacturers. August 19, 1925.

"LACTOGEN."

460,158. For chemical substances prepared for use in medicine and pharmacy. Nestlé and Anglo-Swiss Condensed Milk Co. (a company incorporated according to the laws of Switzerland), Cham and Vevey, Switzerland; and St. George's House, 6 and 8, Eastcheap, London, E.C.3; manufacturers. June 30, 1925. (To be associated. Sect. 24.)

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICALS.—The Kolonial Etablissement, Amsterdam, is inviting tenders by October 7, for wood spirit, zinc white, carbonate of soda, yellow ochre and minium of lead. Copy of the schedule is available for inspection by U.K. firms on application to the D.O.T. (Inquiry Room).

OILS, LIME, ETC.—Tenders are invited for the supply of fireclay pipes, lime, oil and paints for Dundee Town Council. Forms from City Engineer, 91, Commercial Street, before October 1.

CHEMICALS, ETC.—A firm of commission agents established in Cairo desire to be placed in touch with British exporters of chemicals, drugs, sole leather, and tanning extracts. (Reference No. 361.)

Tariff Changes

BELGIAN CONGO.—Import licences are now required for cement and salt.

BELGIUM.—New regulations regarding the wholesale importation of crude petroleum, its derivatives and residues, come into force on November 1. A general licence will be issued for the importation in bulk of the following grades of petroleum:—crude, not refined or purified; refined or purified oils, light; and heavy oils; whilst individual licences will be required for the wholesale importation of crude paraffin, liquid or solid; and crude vaseline.

MEXICO.—The import duty on solidified alcohol for heating is now 25 cents per kilog. gross.

Nobel Industries Report Progress

SIR HARRY MCGOWAN, chairman and managing director, presided at the annual general meeting of Nobel Industries, Ltd., in London on Friday, September 18.

In his survey of the activities of the company he referred to the satisfactory export trade and to the home trade in explosives which could be considered satisfactory in view of the coal situation. Progress in South America continued and the company had now secured a recognised position. African Explosives and Industries, Ltd., had had an excellent year. Considerable progress had been made in the production of fertilisers, sheep dips, and other chemicals.

"It must," said Sir Harry, "be a source of gratification to our shareholders to see the distinctly improved prospects of the Dunlop Company. Here again we have realised part of our holding at a substantial profit. We retain our holding of Preference shares in the British Celanese Company, and you will be acquainted from other sources with the progress made by them. For some time past the conviction was growing upon me that the business required the services of an all-time chairman, and about the end of that company's last financial year—during which a substantial profit was made on trading account—I vacated the chair in favour of Major-General Guy Dawnay, who came to the company with an excellent reputation."

He was of the opinion that in the future trade would be well maintained abroad, but the home conditions made prophecy inadvisable.

Classes in Industrial Economics

THE National Industrial Alliance has again organised classes for the study of Industrial Economics and kindred subjects, and the fourth season opens early in October. Classes are held at the London School of Economics or at the offices of the Alliance. No charge is made for these courses either to the student or to the nominating firm if that firm is a member of the National Industrial Alliance. In addition to these classes, a Special Course has been arranged in conjunction with the Department of Industrial Administration of the Regent Street Polytechnic, and adapted for students qualifying for managerial or administrative posts. In this case the charge will be £3 per student, for the whole of the Special Course, or £1 for each subject. All applications should be sent direct to the National Industrial Alliance, 25, Queen Anne's Gate, London, S.W.1.

A New Mond Product

At the Mond works at Dudley Port, where power gas and sulphate of ammonia are made, the atmosphere is so laden with corrosive fumes and sulphuric acid that the roofs and exposed iron and wood work were being eaten away. Many bituminous paints were experimented with, but not one was protective enough to prevent the corrosion.

Accordingly the Mond Tar By-Products Syndicate Ltd. set to work to manufacture an improved colloidal bituminous paint which *would* withstand these conditions. Melanoid is the result.

No acid or alkali can attack metal or wood work protected by Melanoid. Expansion and contraction cannot crack it, it is elastic. No heat can blister it, it keys right into the metal and holds *tight*.

Whether business is good or depressed, exposed iron work, roofs, chimneys, pit-head gear, furnaces, etc., *must* be protected. Nothing can protect these so thoroughly as Melanoid. Melanoid is made in 15 different grades to suit all purposes—from protecting blast furnaces to coating small castings. Write for full particulars.

MOND
TAR BY-PRODUCTS

MELANOID

The Improved Colloidal Bituminous Paint

Melanoid is sold by Ironmongers, Builders' and Plumbers' Merchants, and Paint Shops everywhere.

Bitumen being intensely black, most other bituminous paints are to be distrusted unless dark in colour. Many coloured so-called bituminous paints contain only 1% of bitumen because so much colouring matter has to be introduced to dilute the black. They are not bituminous paints at all and naturally have practically none of the protective qualities of bitumen. *This does not apply to Melanoid, the improved colloidal bituminous paint.* The bitumen content on the dried Melanoid film is very high. Black Melanoid Standard contains 100%. Brown 55%. Brown Heavy Body 75%. Red (light or dark) 45% and Green (a nice bright colour most suitable for windows, woodwork, etc.) 40%. Some grades of coloured Melanoid are as protective as the black. All of them contain a higher bitumen content than any other coloured bituminous paints.

Zulite is the best wood preservative

THE MOND TAR BY-PRODUCTS SYNDICATE LTD., 47, VICTORIA STREET, LONDON, S.W.1, ENGLAND

Latest Government Contracts

THE following contracts have been placed recently by the various Government Departments :—

Admiralty

CIVIL ENGINEER-IN-CHIEF'S DEPARTMENT.—Asbestos Corrugated Sheets : British Fibrocement Works, Ltd., Erith, Kent.

CONTRACT AND PURCHASE DEPARTMENT.—Thermometers, Hydrometers, etc. : B. Black and Son, London, E.C. ; A. C. Cossor and Son, London, N. ; Short and Mason, Ltd., London, E.C.

War Office

Aluminium Alloy : British Aluminium Co., Ltd., Stoke-on-Trent. Aluminium Ingot : British Aluminium Co., Ltd., Warrington. Asbestos Cement Slates, etc. : British Fibrocement Works, Ltd., Erith, Kent. Oil, Lubricating, Steam Cylinder, Heavy : Anglo-American Oil Co., Ltd., Purfleet. Oil Drums : G. T. Johnson and Co., Liverpool.

Post Office

Petroleum, Jelly : Kingfisher, Leeds ; Lancashire Tallow and Fat Co., Ltd., Prescot, Lancs. Oil, Colza : Younghusband, Barnes and Co., London, S.E. Paint : Foster, Mason and Harvey, Ltd., London, S.E.

H.M. Office of Works

Glass : Hampton and Sons, Ltd., London, S.W. ; Pilkington Bros., Ltd., St. Helens ; F. Sage and Co., Ltd., London, W.C.

Crown Agents for the Colonies

Cement : Cement Marketing Co., Ltd., London, S.W. ; T. Beynon and Co., Ltd., 9-13, King William Street, E.C. Chemical Apparatus : Baird and Tatlock, Ltd., 14, Cross Street, E.C.1. Dynamite : Nobel Industries, Ltd., London, S.W. Engine, Oil : The Campbell Gas Engine Co., Kingston, Halifax. Metal, B.R.C. : British Reinforced Concrete Engineering Co., Manchester. Neokharsivan : Burroughs Wellcome and Co., London, E.C. Oil : C. C. Wakefield and Co., Ltd., London, E.C. Oil, Engine : The Vacuum Oil Co., Ltd., London, S.W. Petrol and Kerosene : F. and A. Swanzy, Ltd., London, W.C. Quinine : Howards and Sons, Ltd., Ilford, Essex. Sheets, Corrugated, Asbestos, etc. : British Fibrocement Works, Ltd., London, W.C. Sheets, Asbestos Cement : Bell's Poilite and Everite Co., London, S.E. Solignum : Major and Co., Ltd., London, W.C.

X-Rays in Industry

MR. C. NORMAN KEMP, lecturer on technical radiology, writing from Edinburgh to the *Glasgow Herald*, says that . . . "the possibilities of usefully employing X-rays in other directions is rather apt to be lost sight of. At the end of last year a distinguished American scientist, Dr. George L. Clark, of the Massachusetts Institute of Technology, published an article entitled, " The Versatility of Röntgen Rays," in which he enumerates 37 distinct applications of unquestioned importance. He concludes as follows :—' Who would have dreamed in 1895 that in 1924 great hospitals, dental laboratories, Government arsenals, University departments of physics, chemistry, engineering, metallurgy, biology, and medicine, factories producing sulphuric acid, or sheet metal, or paper, or bridges, or automobile tyres, or chemicals, Customs Houses, detective agencies—all would have Röntgen-ray laboratories working at top speed ? '

" Notwithstanding the fundamentally important technical work of Dr. G. W. C. Kaye, of the National Physical Laboratory, and of Dr. V. E. Pullin, of Woolwich Arsenal, and others, it is regrettable that the extent to which X-ray methods may be turned to account is not as fully recognised in this country as, for example, in France and America.

" It also appears to me unfortunate that greater facilities do not exist for obtaining instruction on the technical applications of X-rays, and I would therefore venture to bring to the notice of your readers the fact that the Royal Technical College provides such facilities, the lecture course commencing towards the end of the present month having been inaugurated in 1923. A start has already been made with the equipment of an X-ray laboratory, and the college gratefully acknowledges the gift of a Coolidge X-ray tube from The British Thomson-Houston Co., Ltd., Rugby, through their distributing agents, Watson and Sons (Electro-Medical), Ltd., London. With this expensive and essential apparatus it is now possible for students to carry out experiments in the non-medical branches of X-ray applications."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

SYNTHETIC PRODUCTS CO., LTD., London, E.C. (M., 26/9/25.) Registered September 11, £3,500 debs. (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £1,450 ; general charge. *£10,700. June 22, 1925.

Satisfaction

PARIPAN, LTD., London, W., manufacturers of paints and varnishes, etc. (M.S., 26/9/25.) Satisfaction reg. September 15, all moneys, etc., reg. May 2, 1922 (*re* 27, Gloucester Square, W.).

London Gazette, &c.

Bankruptcy Information

BOOTH, Thomas Arthur, Louisa Street, Idle, Bradford, wholesale manufacturing druggist. (R.O., 26/9/25.) Receiving order, September 18. Debtor's petition. First meeting September 29, 11 a.m., the Official Receiver's Office, 12, Duke Street, Bradford. Public examination October 19, 10.15 a.m., the County Court, Manor Row, Bradford.

Company Winding Up Voluntarily

DONKIN, KENYON AND CO., LTD. (C.W.U.V., 26/9/25.) W. H. Marsden, 43, Preston New Road, Blackburn incorporated accountant, appointed liquidator September 11.

Receivership

CLAYTON GLUE WORKS, LTD. (R., 26/9/25.) R. T. Tiplady, of 12, Bowkers Row, Bolton, C.A., was appointed receiver on September 12, 1925, under powers contained in charge dated October 7, 1922.

New Companies Registered

FORSYTH, JONES AND CO., LTD., 14, Southampton Street, Strand, London. Manufacturers of chemicals and manures ; chemists, druggists, distillers, gas makers, cement and concrete manufacturers, etc. Nominal capital, £1,500 in £1 shares.

LANDORE OXIDES, LTD. Manufacturers of zinc oxide and zinc dust, etc. Nominal capital, £5,000 in £1 shares. A director : G. H. Elliott, 4, Upper Church Parks, Mumbles, Swansea.

LEWISHAM NUT EXTRACTING AND REFINING CO., LTD., 49/50, Newgate Street, London. Refiners, millers, extractors, manufacturers and treaters of oils, oil cakes and all kinds of products of nuts, etc. Nominal capital, £1,000 in £1 shares.

OIL SENTRY BOXES, LTD. Manufacturers, vendors, and factors of and dealers in covers or cabinets for barrels, drums, and other receptacles for varnishes, paints, disinfectants, oil, petrol, etc. Nominal capital, £550 in 500 preferred ordinary shares of £1 and 1,000 ordinary shares of 1s. Solicitors : Shepheards, Walters and Bingley, 23, Young Street, Kensington, London.

Trade with Germany

IT is stated unofficially that the German Government is to terminate the import licence scheme when the new tariff conditions come into force on October 1. If this measure is confirmed it will have an excellent effect on trade with Germany, and Lancashire manufacturers are stated to be much relieved at the possibility of the removal of a restriction which has made their trade with Germany almost prohibitive.